

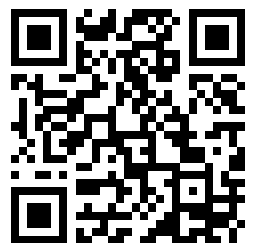


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Spon

V

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SPONS'

ENGINEERS' AND CONTRACTORS'

ILLUSTRATED BOOK OF PRICES

OF

MACHINES, TOOLS, IRONWORK,

AND CONTRACTORS' MATERIAL,

FOR 1876.



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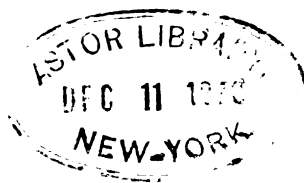
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VFC



PREFACE.



In offering this Work to the public the Publishers consider any explanation on their part to be unnecessary, as the book speaks for itself.

The advantages of an Illustrated Directory and Price Book, such as the present, are that it contains in one volume, adapted for ready reference, information relating to Tools, Machines, Ironwork, and Contractors' Material, that cannot be found elsewhere in so convenient a form; also of its being circulated throughout the world by means of the English and Foreign Book Trade, so that copies of the book can be purchased on the Continent, Australia, India, the Cape, Japan, New Zealand, the Brazils, South America, the West Indies, Canada, the United States, and in all other countries where English books are sold. Its convenient form gives it a great advantage over periodicals, loose catalogues, and circulars, which are apt to be mislaid, and are not adapted for ready reference.

It may be said in objection to its subject matter that different manufacturers make similar machines, and so the same information is given twice over; but the style of workmanship, material employed, and the various special uses they are designed for, as well as the personality that is attached to individual firms, give each article a character of its own.

Possibly this Work could have been made more perfect, but as it stands the large quantity of useful matter the book contains will make it of great value to all persons interested in Engineering Appliances at home and abroad, and the Publishers hope that in future editions, with the courteous assistance of the various firms interested in the success of this work, it will increase in value and importance.

48, CHARING CROSS,
December, 1875.

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ALEX. WILSON & Co.,

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LONDON, S.W.

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1875.

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ALEX. WILSON AND CO.,
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INTRODUCTION.

IN presenting this Illustrated Catalogue to our numerous Customers at home and abroad, we would call special attention to the fact, that in addition to illustrating our various Special Manufactures as copiously as possible, we have always endeavoured to give the greatest possible details in regard to Dimensions, Weights, and Prices, all arranged in Tabular Price Lists convenient for reference. Our great object has been to save our Customers the trouble of first communicating with us to ascertain these particulars, which leads to so much delay in the case of Machinery required in foreign countries. For the information of our numerous customers in all parts of the world, we beg to remark that we keep many of our manufactures largely in Stock or in progress, for the purpose of enabling us to give quick delivery; and in any case, when we do not happen to have the Machinery thus in Stock or in progress, we can, by means of our extensive and varied plant, generally execute our Orders promptly.

We have confined ourselves to a few leading Specialities, instead of ranging through the wide and varied field of Modern Mechanical Engineering, and have thus, as well as by Special Tools and keeping our workmen steadily employed, effected a considerable saving in the cost of manufacture. We do not, however, pretend to say that our Machinery is the cheapest that can be had, because we have built up our business on the principle that sound and sufficient material, combined with good workmanship, should always be our first consideration. In conclusion, we would call attention to the fact that good Machinery is the most profitable investment that can be made, while bad Machinery is one of the worst, as the result of one break-down may, in a manufactory, result in the loss of many times the value of the Machine.

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The great success which has attended the introduction of the "*Vauxhall Donkey-Pumps*" has convinced us that they only require to be better known among Engineers to extend their application; as we are sure the Pumps recommend themselves by their excellence and moderate price. [4500 of these Pumps have now been sold, and 100 per month are now being manufactured.]

The "Vauxhall Donkey-Pumps" have now stood the test of many years' practical work, the demand for them has steadily increased year by year, and they are now recognized by all the leading engineers in every country where steam power is used as a most reliable fitting to a Steam Boiler. We would call special attention to the fact, that of our total sales more than 90 per cent. has been to the trade; and this result has been attained solely by our strict attention to the quality of our materials and workmanship; while, by the large demand, enabling us to employ special machinery in their construction, we are enabled to sell them at a price which no other Manufacturer can attempt to approach. Several attempts have been made to introduce similar Pumps, but they have **gradually** disappeared, and we are now the only leading Manufacturers of such Pumps in this country. Purchasers on the Continent are cautioned against purchasing an inferior imitation of these Pumps, now being manufactured in Germany. None are genuine unless purchased from our Works direct, or from our accredited Agents with our name attached.

The Giffard Injector is not so generally employed as was supposed it would be when it was first introduced, as it is found to be too delicate for ordinary usage; and in spite of all the improvements that have been made on it, it is not yet an infallible Boiler feeder with bad water and careless treatment, whilst it cannot be repaired by an ordinary mechanic. Since the expiry of the original "Giffard's" Patent, the price of these Injectors has been reduced to one-half, and a great number of modifications have been brought out by various Manufacturers, and as a consequence the quality of workmanship has been very much reduced; the result being that owing to the reliability of our Pumps, the demand for them has enormously increased. Since the introduction of this Donkey Pump, many Engineers have ceased to put Pumps on their Steam Engines, because it is better to have the feed pump close to the Boiler, and thus save the long lengths of feed pipe, which are always leaking and bursting, whilst the feed apparatus is brought more directly under the control of the stoker. As Engines for special purposes, running at a very high speed, are coming into extensive use, it is absolutely necessary to dispense with the feed pump on them, as it would wear out very soon when worked at such a speed. A Donkey Pump also dispenses with the necessity of running the large Engine during meal hours, merely to get a little water in the Boiler. There are many other purposes to which these Pumps can be applied, and they are especially useful wherever liquids or semi-liquids require to be forced, such as in Breweries, Distilleries, Gas Works, Chemical Works, &c.

ALEX. WILSON AND CO.,
ENGINEERS, VAUXHALL IRON-WORKS, NINE ELMS, LONDON, S.W.

VAUXHALL DONKEY-PUMPS.

FIG. 1.

FIG. 2.

DESCRIPTION.

Fig. 1 represents a section of the No. 6 single-action Pump, and Fig. 2 a section of the No. 10 double-action Pump; Fig. 3, on the following pages, shows all the Pumps from No. 4 to No. 12 in elevation. It will be seen that the steam cylinder is cast in one piece with the water cylinder. These two cylinders being bored at the same time, and with the same boring bar, always have their axes perfectly in the same line. In the single-action Pump, the steam piston is cast in one piece with the piston of the Pump, and is of the best gun metal; the glands being of the same material. Gun metal is preferred, because it absorbs less power in friction, and is not so liable to rust if the Pump is standing for any length of time. The fly wheel, which only

serves to carry it over the dead centre, is of moderate dimensions; it is driven by a connecting rod, which works on a cross head, fixed on the piston rod; this cross head is guided by a round bar, which unites the Pump to the steam cylinder. The bearings of the fly-wheel shaft are of gun metal, and are fixed on the cover of the steam cylinder; the valve is worked by an eccentric fixed on the end of the shaft; and this eccentric moves the valve by means of a slotted link made in one piece with the valve rod. The double action resembles the single action, except that the piston rod is made of steel. No. 4 to No. 6 are made with a simple slide valve. No. 7 to No. 12 have piston valves working in a gun-metal tube, as shown in the engraving. The workmanship, owing to the division of labour employed, is of the best description; the workmen being able to attain great excellence through being always engaged on one detail.

The speed of these Pumps varies from 180 strokes per minute for No. 4, to 80 for No. 12; they can pump boiling water, if care is taken to have the tank from which the water is drawn placed above the level of the suction valves, and also to work the Pump at a moderate speed.

ALEX. WILSON AND CO.,
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VAUXHALL DONKEY-PUMPS.

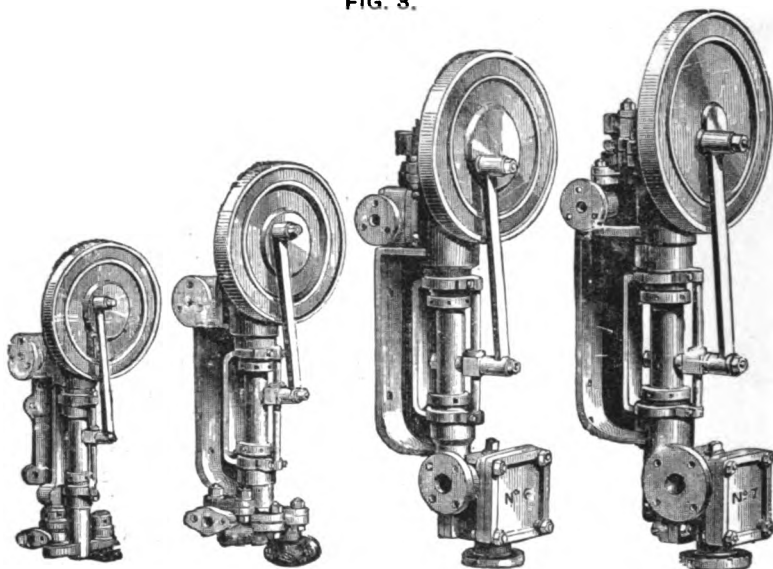
300 OF THESE PUMPS ARE ALWAYS IN PROGRESS, AND A LARGE STOCK ALWAYS READY PACKED.

Every Pump is carefully Tested before leaving the Works.

SAME SIZES OF PUMPS ARE ALSO MADE OF SPECIAL PROPORTIONS AND STRENGTH TO WORK AT FROM 100 TO 200 LB. PRESSURE, AT A COST OF 50 PER CENT. EXTRA. THEY ARE ALSO MADE WITH RAMS REDUCED IN DIAMETER TO WORK AT A PRESSURE OF LESS THAN 20 LB.

FIG. 3.

STOP VALVES,
CHECK VALVES,
AIR VESSELS,
FLANGES and PIPES
ARE SUPPLIED
AT
MODERATE PRICES.



SIZES OF PUMPS.	No. 4.	No. 5.	No. 6.	No. 7.	*No. 8.
Diameter of Steam Cylinder, inches ..	2 $\frac{1}{8}$	2 $\frac{1}{2}$	3 $\frac{1}{8}$	3 $\frac{3}{4}$	3 $\frac{3}{4}$
Diameter of Pump, inches	1 $\frac{1}{4}$	1 $\frac{1}{2}$	1 $\frac{7}{8}$	2 $\frac{1}{4}$	2 $\frac{1}{4}$
Stroke, inches	2 $\frac{1}{2}$	3	4	4	4
Diameter of Steam Pipes, inches ..	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$
Gallons thrown per hour	100	150	250	400	700
Horse-power of Boiler supplied ..	8	12	20	30	50
Diameter of Water Pipes, inches ..	$\frac{3}{4}$	1	1 $\frac{1}{4}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$
DIMENSIONS of Packing { Length ..	28	32	39	40	43
{ Breadth ..	12	14	16	17	17
Cases, inches { Depth ..	12	14	16	16	16
Net weight of Pump, lbs.	48	78	150	175	215
Total weight, lbs.	63	100	194	234	278
Price of Packing Case	3s. 6d.	4s. od.	5s. od.	6s. 6d.	7s. od.
Price of Pump, delivered in London ..	£7 10s.	£10 os.	£13 os.	£15 os.	£17 10s.

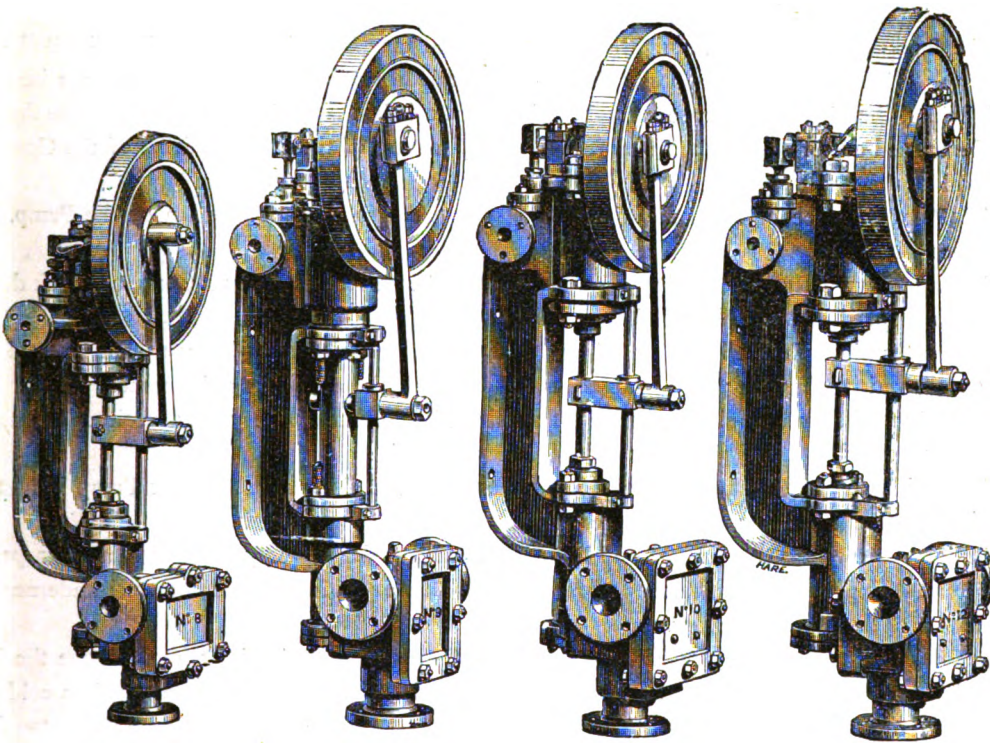
Cast Iron or Indiarubber Valves supplied free of charge, when required, instead of the usual Gun Metal ones.

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ENGINEERS, VAUXHALL IRON-WORKS, NINE ELMS, LONDON, S.W.

VAUXHALL DONKEY-PUMPS.

WILL FORCE WATER AT A TEMPERATURE OF 200°.

FIG. 3.



SIZES OF PUMPS.	No. 9.	*No. 10.	*No. 12.	*No. 14.	*No. 15.	*No. 16.
Diameter of Steam Cylinder, inches	4 $\frac{1}{8}$	4 $\frac{1}{8}$	4 $\frac{5}{8}$	5 $\frac{3}{4}$	6 $\frac{1}{2}$	8
Diameter of Pump, inches	2 $\frac{1}{2}$	2 $\frac{1}{2}$	2 $\frac{3}{4}$	2 $\frac{1}{2}$	3	3 $\frac{3}{4}$
Stroke, inches	6	6	6	9	10	12
Diameter of Steam Pipes, inches. ..	1	1	1	1 $\frac{1}{4}$	1 $\frac{1}{2}$	2
Gallons thrown per hour	900	1500	1800	3000	4000	7000
Horse-power of Boiler supplied ..	60	100	120	200	300	500
Diameter of Water Pipes, inches ..	2	2	2 $\frac{1}{2}$	3	3 $\frac{1}{2}$	4
DIMENSIONS of Packing { Length ..	48	53	56	67	72	81
{ Breadth ..	20	20	22	28	30	36
{ Depth ..	19	19	20	29	32	33
Net weight of Pump, lbs.	314	330	460	1120	1680	2352
Total weight, lbs.	402	418	572	1260	1932	2630
Price of Packing Case	8s. od.	9s. od.	12s. od.	15s. od.	20s.	24s. od.
Price of Pump, delivered in London	£20 os.	£22 10s.	£30 os.	£45 os.	£55 os.	£65 os.

* Nos. 8, 10, and 12 are double action. For design of Nos. 14, 15, and 16, see Fig 4.

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VAUXHALL DONKEY-PUMPS.

DIRECTIONS FOR FIXING AND WORKING.

The Pump must be placed upright, or nearly so, and may be bolted to a wall, to the Boiler itself, or to any other convenient support. It is recommended to use a piece of wood from 2 in. to 4 in. thick behind the Pump, and care must be taken that this bed is perfectly level, otherwise the Pump may be twisted out of shape when screwed up, and jamming of the ram and firing of the Connecting Rod will be the result.

All Pipes *must* be of the same diameter as the corresponding connection on the Pump. (For Prices see List.)

A Screw-down Valve should always be used for the Steam Regulator, as a Common Cock does not regulate the speed so well. (For Prices see List.)

The water pipes should be as straight as possible, and no elbows or knees should be used under any consideration whatever; Bends alone should be used, the cost being the same. An Air Vessel adds greatly to the smooth, silent, and steady working of the Pump. They may be either of Cast Iron or Copper, according to the pipes used. (For Prices see List.)

A Check Valve is necessary where the water enters the Boiler, as it allows the Pump Valves to be examined while steam is up. (For Prices see List.)

All joints are sent out made with red lead alone, which under ordinary pressures ensures a perfectly tight joint. Under no circumstances whatever must Gasket or Indiarubber be used underneath the Top Cover of the Steam Cylinder.

In forcing water at 212° it is necessary to have the Supply Tank about 10 ft. above the Pump, lower temperatures in proportion. Hot water cannot be pumped at the same speed as cold; time must be given for it to flow through the Valves. Care must be taken not to run the Pump too fast, as the slower it works the better it is for lessening wear and tear. An Air Vessel should always be used when forcing hot water.

When water is drawn from any depth, a foot valve should be used to keep the pipe always full. (For Prices see List.)

When water has to be drawn above 12 ft., the double-action Pump should be ordered with Leather Pistons and Indiarubber Valves (no extra charge), when they will draw from a depth of 25 ft. The smaller Ram Pumps should never be made to draw from more than 15 ft. to 20 ft. For feeding Boilers at low pressures of about 10 lb. to 15 lb., special Pumps can be made at an extra cost of 5 to 10 per cent. Cast-iron Valves, &c., for Chemical purposes are supplied without extra charges. When the Pumps are employed in raising water, they will force it 2 ft. high for every lb. of Steam Pressure in the Boiler by which they are worked.

When at work care must be taken that the working parts shall not suffer from want of Oil. When they are fixed in stoke holes, or otherwise exposed to grit, they should be enclosed in a wooden case, and kept as clean as any other piece of Machinery. Care must be taken not to screw down the Glands too tightly or all on one side by tightening one nut more than the opposite one. Care must also be taken that the Bearing behind the Fly Wheel is never allowed to get loose.

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*Price List of Fittings, Pipes, &c., required for fixing the Vauxhall
Donkey-Pumps.*

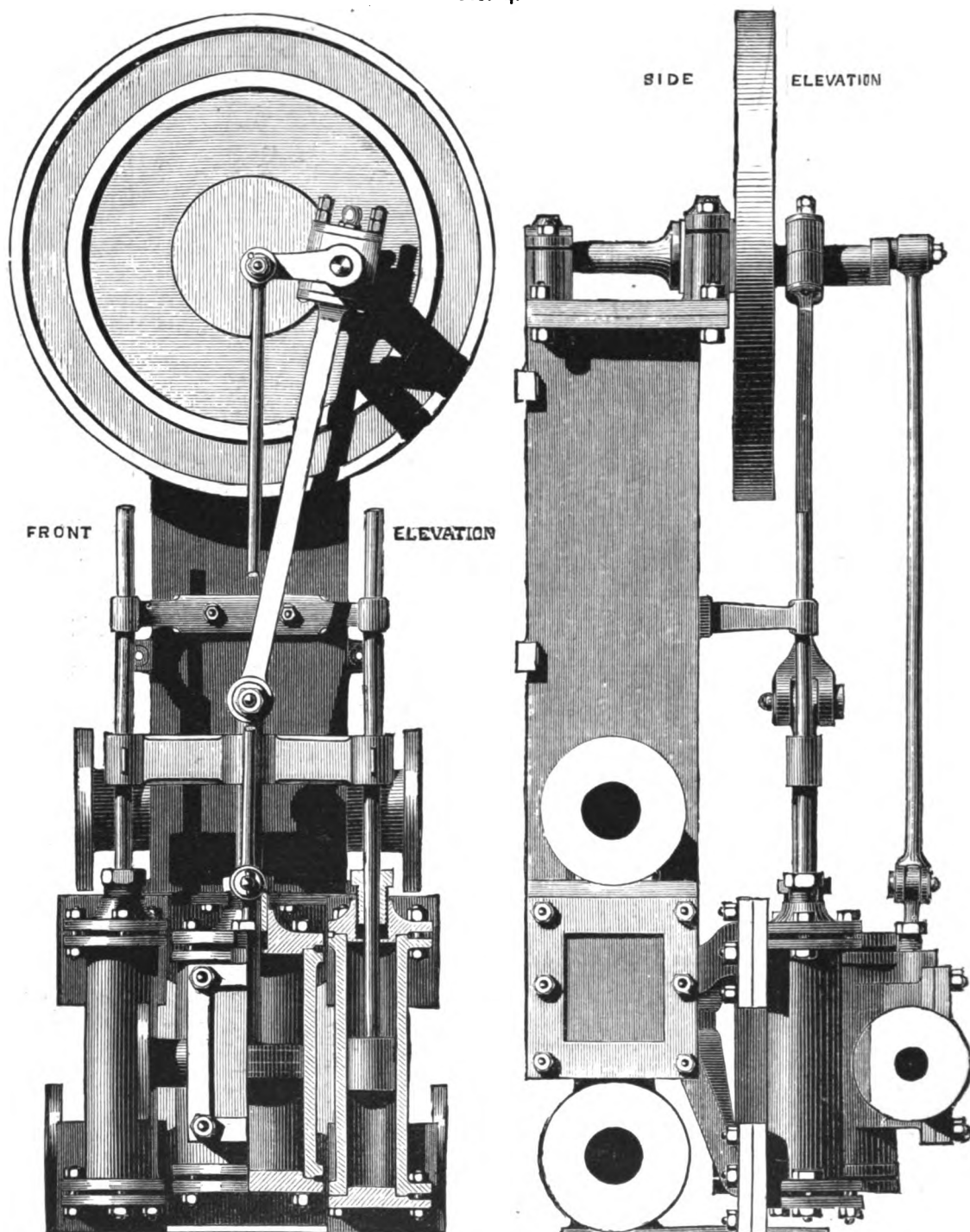
NUMBER OF DONKEY PUMPS.	4	5	6	7	8	9	10	12	14	16	18
Price of Pump	£7 10	£10	£13	£15	£17 10s.	£20	£22 10s.	£30	£45	£55	£65
Extra if made to work by hand	15/0	18/0	22/0	25/0	25/0	34/0	34/0	40/0	..	..	..
Packing Case of Pump	3/6	4/0	5/0	6/6	7/0	8/0	9/0	12/0	15/0	20/0	24/0
Copper Air-Vessel to braze to Copper Pipes	25/0	30/0	37/6	55/0	65/0	75/0	75/0	85/0	*	*	*
Cast-Iron Air Vessel with Flanges	7/0	9/6	14/0	17/6	17/6	21/0	21/0	24/0	*	*	*
Steam Stop-Valve of Gun Metal with One Flange, and Fitted to Pump with Bolts	8/6	10/0	12/6	15/0	15/0	17/6	17/6	22/6	22/6	27/6	40/0
Check Valve of Gun Metal	15/0	22/6	30/0	35/0	35/0	47/6	47/6	65/0	70/0	90/0	120/0
Check Valve in Cast-iron Case	..	..	25/0	27/6	27/6	37/6	37/6	50/0	60/0	75/0	90/0
Foot Valve for Suction Pipe	12/6	15/0	17/6	20/0	20/0	25/0	25/0	30/0	35/0	42/0	50/0
Steam and Exhaust Flanges, fitted to Pump with Bolts	4/0	4/0	6/6	6/6	6/6	8/0	8/0	8/0	10/0	12/0	14/0
Suction and Delivery Flanges, fitted to Pump with Bolts	6/6	6/6	9/6	10/0	10/0	13/0	13/0	16/0	21/0	28/0	32/0
Steam and Exhaust Pipes, per foot	0/3½	0/3½	0/4½	0/4½	0/4½	0/6	0/6	0/6	0/8	0/10½	1/4
Suction and Delivery Pipes, per foot	0/4½	0/6	0/8	0/10½	0/10½	1/4½	1/4½	2/0	3/4	4/2	5/3
Steam and Exhaust Bends, each	0/6	0/6	0/9	0/9	0/9	0/11	0/11	0/11	1/4	1/8	3/2
Suction and Delivery Bends, each	0/8	0/11	1/4	1/8	1/8	3/2	3/2	5/0	12/0	18/0	24/0

* Air Vessel not required for these.

See Directions for Fixing on previous page.

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FIG. 4.



Pumps Nos. 14, 15, and 16 are made to this design. For Prices, &c., see Table under Fig. 3. Description on next page.

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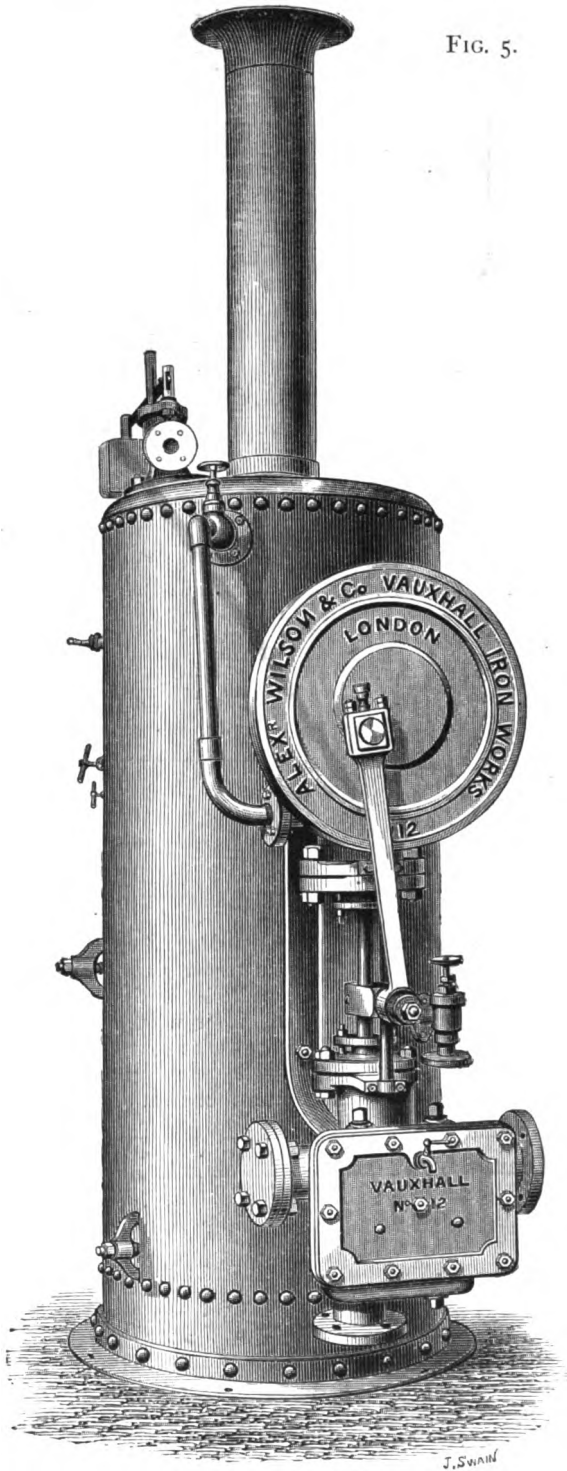
VAUXHALL DONKEY-PUMPS.

Fig. 4, on opposite page, represents a Steam Pump of a different design; it has two water cylinders, placed to right and left of the steam cylinder; it occupies the smallest possible space for a fly-wheel Pump, the frame at same time forming a large air vessel. The suction and delivery pipes can be arranged either to the right or left. The two water cylinders communicate with the same valves, these valves being easily accessible by means of doors to the right and left. The rods of the water pistons form guides for the rod of the steam piston. This type of Pump can also be used as an ordinary steam engine, the fly wheel being turned to receive a band. It is made in three sizes, of the dimensions given in the table at page 7: Nos. 14, 15, and 16.

Fig. 5 represents one of our No. 12 Vauxhall Donkey-Pumps fixed to a Vertical Boiler, and adapted for use as a small pumping engine for a railway station, similar to the larger one shown at Fig. 6.

For the purpose of feeding the boiler a stop valve is placed on the rising main, by shutting which water can be forced into the boiler through the check valve when the pressure of steam is greater than the head of water in tank. This style of pumping engine is a convenient one whenever a small independent supply of water has to be pumped. We quote for several sizes, but we recommend that the largest size should be used, as the extra expense is very little, and by doing the work in a shorter space of time the cost of attendance is reduced.

No. of Pump	8	9	10	12
Gallons per hour ..	700	900	1500	1800
Maximum height in feet, pumped with 45 lb. pressure ..	100	100	100	100
Diameter of Boiler ..	2' 3"	2' 3"	2' 6"	2' 6"
Height of Ditto ..	4' 6"	4' 6"	5' 0"	5' 0"
Price of Pump, Boiler, and Valve, without Pipes	£50	£53	£60	£68
Extra for Water Pipe, per foot	10½d.	1/4½	1/4½	2/0
Extra for Funnel per foot, when exceeding 4 feet	3/6	3/6	4/0	4/0



J. SWAIN

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STEAM PUMP.

FIG. 6.

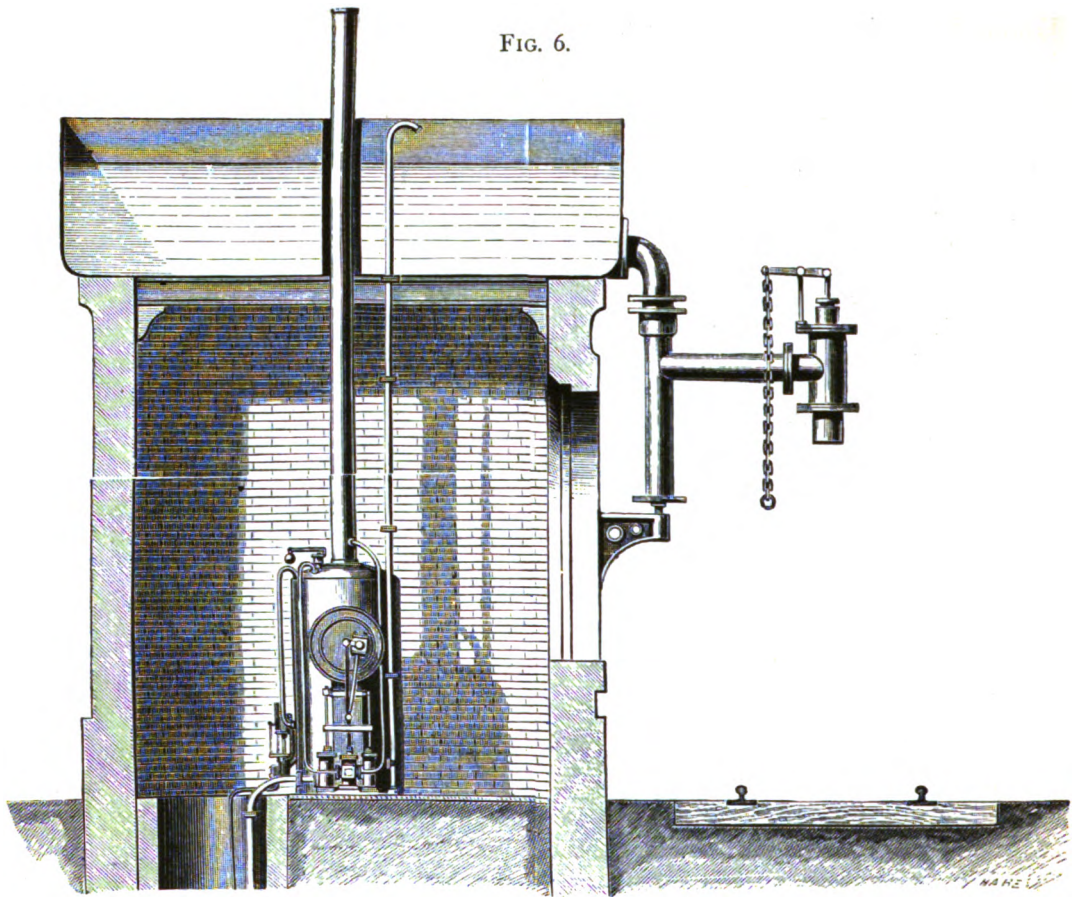


Fig. 6 represents one of our large Steam Pumps, Nos. 14, 15, or 16, fixed to a Vertical Boiler, and adapted for the supply of a water tank at a railway station. These Pumps are represented on a larger scale in Fig. 4. The Boiler is fed by a small Steam-Pump (No. 4 on the List). The water tank may be constructed of either wrought or cast iron; it forms at the same time the roof of the Engine House; the exhaust can be turned into it, thus slightly warming the water and preventing it from freezing in winter. The water crane can either be at a distance, or it can be fastened against the wall of the Engine House as shown.

PRICE LIST OF COMBINED BOILERS AND PUMPS.

No. of Pump	No. 14.	No. 15.	No. 16.	Horse-power of Boiler ..	3	4	6
Diameter of Steam Cylinder	5 $\frac{3}{4}$ "	6 $\frac{1}{4}$ "	8"	Price of Pump and Boiler ..			
Diameter of Water Barrels	2 $\frac{1}{2}$ "	3"	3 $\frac{3}{4}$ "	without Water Pipes ..	£96	£118	£142
Stroke	9	10	12	Extra for Water Pipes, per ..			
Gallons per hour	3000	4000	7000	foot	3/4	4/2	5/3
Diameter of Boiler	2' 6"	2' 9"	3' 3"	Extra for Funnel per foot, ..			
Height of Boiler	6' 6"	7' 0"	8' 0"	when exceeding 5 feet ..	4/0	5/0	6/0

Larger Sizes of Pumps are supplied according to the design shown at Fig. 10. Quotations on application. Estimates given for Tanks and Water Cranes.

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VAUXHALL DONKEY-PUMPS.

FIG. 7.

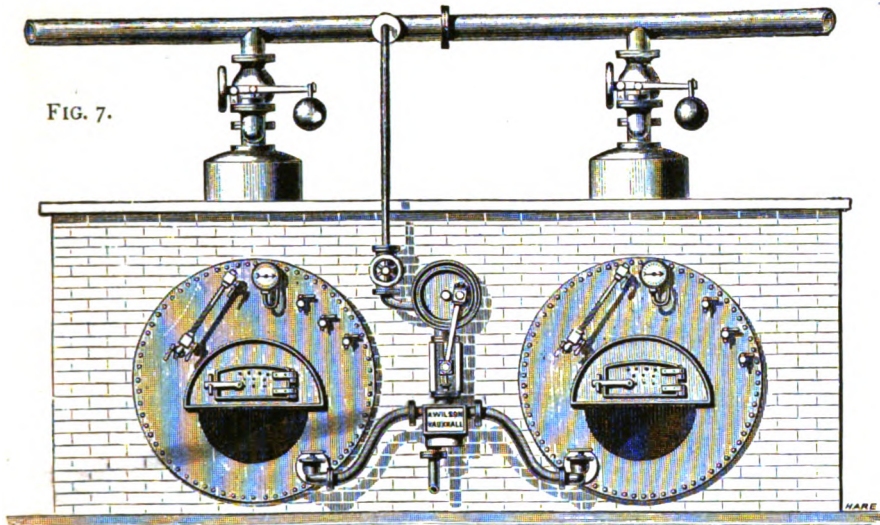
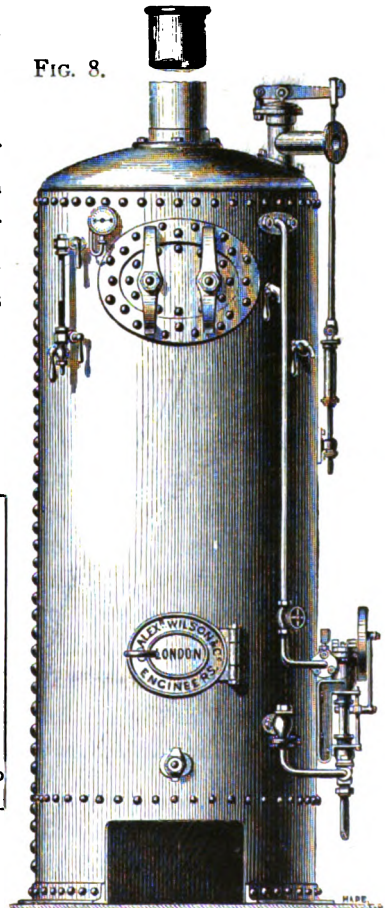


Fig. 7 represents a No. 10 Pump, applied to feed a pair of Cornish boilers, placed right and left of the Pump, so that both can be supplied at once or alternately, by shutting down one or other of the check valves. These Pumps can be fixed in a great variety of ways, according to circumstances and the ideas of the Engineer, some preferring to have a separate Pump for each Boiler, but arranged so that any one of the

Boilers or Pumps in a range can be set down for repairs; others prefer to have one or at most two Pumps for feeding a range of boilers. For Prices of Cornish Boilers see Special List.

Fig. 8 represents a Vertical Boiler, fitted with a small Donkey-Pump for feeding it. In England these Boilers are coming into extensive use, because they are easily fixed; and when provided with a small Pump, they are very useful for distilling fresh water on board steamers and other vessels, as well as supplying steam to the winches on deck. In workshops they are employed for driving steam hammers and other independent machines; and they are extremely useful in all works where they use apparatus for boiling or distilling.

FIG. 8.



PRICE LIST COMPLETE AS SHOWN.

Horse-Power of Boiler	2	4	6	8	10	12
Diameter of Boiler ..	2' 6"	2' 9"	3' 3"	3' 6"	4' 0"	4' 0"
Height of Boiler, including Ashpit ..	5' 6"	7' 0"	8' 0"	9' 0"	10' 0"	11' 6"
Size of Donkey Pumps	No. 4	No. 4	No. 4	No. 5	No. 5	No. 5
Approxim. Total Weight in Cwts.	11	21	30	36	45	52
Price, complete ..	38 10	55 0	70 0	86 0	102 10	117 10

Quotations given for Sizes not on List.

For Prices of Boilers only, see Special List, page 29.

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STEAM PUMPS

DRIVEN BY ENGINE AND GEARING.

FIG. 9.

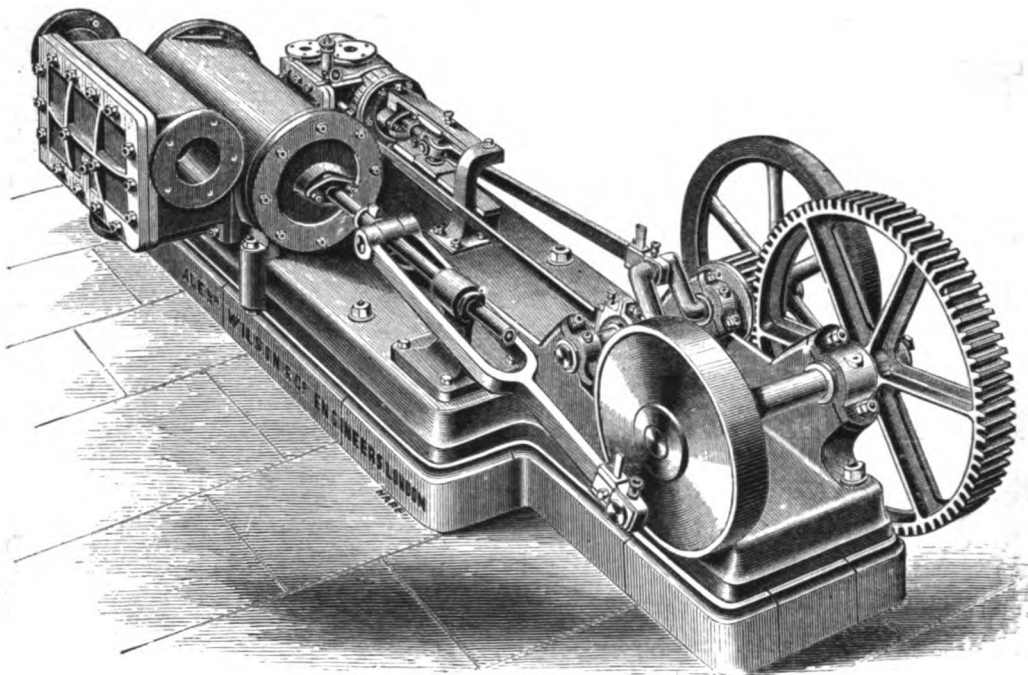


Fig. 9 represents a large Double-acting Pump, 12 inches diameter, 18 inches stroke, driven by a Special Steam Engine, having a steam cylinder 6 inches diameter, 12 inches stroke, the speed of the Pump being reduced from that of the Engine by means of wheel and pinion. By this arrangement the speed of the steam piston is maintained at the proper speed for the most economical use of steam, while the water piston travels at the moderate speed necessary in pumping water. It is complete on one Bed-plate, which is the most convenient arrangement, as it requires no skill to fix it for work, while it is economical in its work as compared with centrifugal pumps when pumping water over 30 feet high, and it is much superior to them in being able to draw from a depth. They are admirably adapted for drainage and irrigation purposes; pumping out cofferdams, and other contractor's work; small water-works and pumping stations for railways; also for many other purposes which will suggest themselves to Engineers requiring such Pumps. The larger sizes are well adapted as Fire Engines, and for raising sunken vessels, when fixed on the deck of a tug. They can also be made portable by fixing them on the top of a Boiler of the Portable Engine type. We make these Pumping Engines of various sizes, as will be seen from the Tabular List on following page. For prices of Boilers to suit these Pumps, see our Boiler Lists for Boilers of corresponding horse-power. Pages 26 to 31.

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Price List, Dimensions, &c., of Pumping Engines.

DESCRIPTION ON PRECEDING PAGE.

Horse-Power.	Diameter of Steam Cylinder.	Stroke of Steam Cylinder.	Diam. of Pump.	Stroke of Pump.	Diam. of Water Pipes.	Gallons per Hour at 50 Revolutions.	Height in feet of water forced at 50 lb. steam pressure.	Approximate Weight.	Price.
	Inches.	Inches.	Inches.	Inches.	Inches.			Cwts.	£
2½	5	7½	4	12	3	3,200	180	12	54
3½	6	9	4	12	..	..	270	15	62
4	6½	9	4	12	..	..	310	17	68
2½	5	7½	5	12	3½	5,000	120	14	62
3½	6	9	5	12	..	..	170	17	70
4	6½	9	5	12	..	..	200	19	76
2½	5	7½	6	12	4	6,500	80	20	72
3½	6	9	6	12	..	..	120	23	80
4	6½	9	6	12	..	..	140	25	86
5	7	10	6	12	..	..	160	28	96
2½	5	7½	7	12	5	9,600	60	17	77
3½	6	9	7	12	..	..	90	20	85
4	6½	9	7	12	..	..	100	22	90
5	7	10	7	12	..	..	120	25	100
2½	5	7½	8	18	6	At 35 Revs. 13,000	48	25	92
3½	6	9	8	18	..	..	70	28	100
4	6½	9	8	18	..	..	80	30	106
5	7	10	8	18	..	..	90	33	116
6	8	10	8	18	..	..	120	37	130
3½	6	12	10	18	7	20,000	40	34	125
5	7	12	10	18	..	..	55	40	140
6	8	12	10	18	..	..	75	44	155
8	9	12	10	18	..	..	100	48	166
3½	6	12	12	18	8	25,000	30	46	145
5	7	12	12	18	..	..	40	50	160
6	8	12	12	18	..	..	50	52	175
8	9	12	12	18	..	..	70	56	186

Price of Larger Sizes on application.

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STEAM BILGE AND BALLAST PUMPS OF ALL SIZES.

Fig. 10 represents a large Bilge-Pump of novel design, two of the largest sizes of which, having Steam and Water Cylinder 12 inches diameter, 15 inches stroke, have been supplied to the White Star Line of American Steamships. The novel feature is in the arrangement of the connecting rod, which is of an oval form, passing on each side of the Steam Cylinder, and thus economizing space. They are made either vertical or horizontal. Special quotations for Sizes not on List.

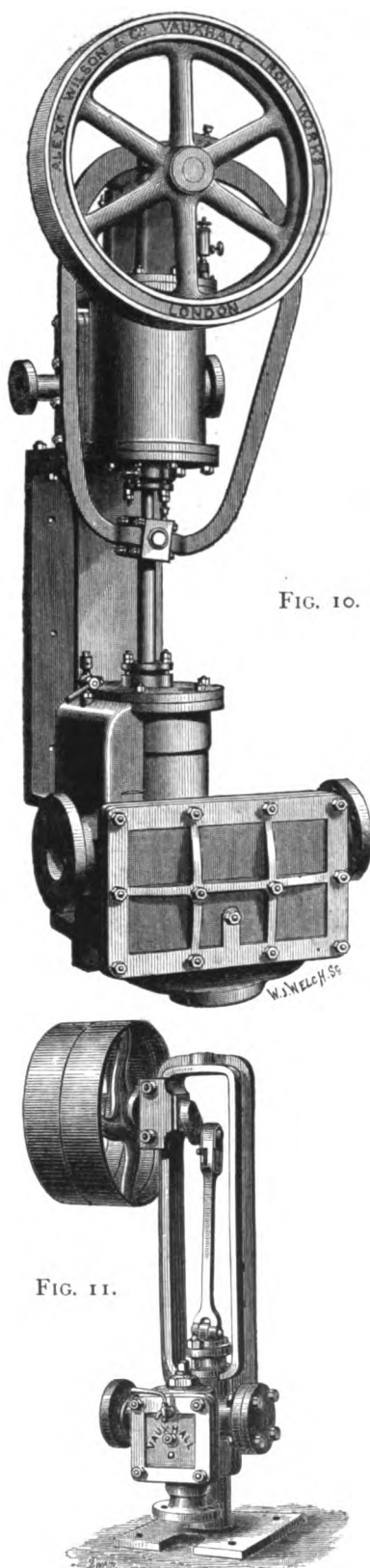


FIG. 10.

No. of Pump	20	21	22	23	24	25
Diameter of Steam Cylinder	9"	9"	10"	10"	12"	12"
Diameter of Water Barrel ..	6"	9"	8"	10"	9"	12"
Stroke	12"	12"	15"	15"	15"	15"
Diameter of Steam Pipe ..	2½"	2½"	2½"	2½"	3"	3"
Diameter of Water Pipe ..	4	6	5	7	6	8
Approximate Weight .. cwts.	25	28	33	38	40	45
Price in London	£75	£90	£100	£120	£135	£150

PUMPS DRIVEN FROM SHAFTING.

Fig. 11 represents a convenient form of Pump where a line of Shafting is more convenient than a supply of steam. The small sizes of these Pumps are made similar to engraving. Rams and Glands are of Gun Metal. The larger sizes have a wheel and pinion, so as to transmit a greater amount of power. The same sizes of Pumps can be also supplied arranged horizontally. Special quotations for Sizes not on List.

PRICE OF SMALL PUMP.

Diameter of Ram	1½"	1½"	2"	2½"	2½"	*3"	*3½"
Stroke	2½"	3"	4"	5"	5"	6"	8"
Diameter of Pulley	6"	10"	14"	16"	18"	20"	24"
Width of Pulley ..	1½"	2"	2½"	3"	3½"	4"	4½"
Strokes per minute	180	150	110	90	90	80	60
Price	£5	£8	£11 10	£14	£17	£20	£22

Those marked * are double acting.

PRICE OF LARGE PUMP.

Diameter of Water Barrel, double acting	3"	3½"	4"	4½"
Stroke	6"	8"	8"	8"
Diameter of Pulley	14"	16"	18"	20"
Width of Pulley	2½"	3"	3½"	4"
Diameter of Pinion	3½"	4"	4½"	5"
Diameter of Wheel	10"	12"	14"	16"
Strokes per minute	80	60	60	60
Price	£22	£25	£28	£33

FIG. 11.

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PUMPS FOR BOILER PROVING

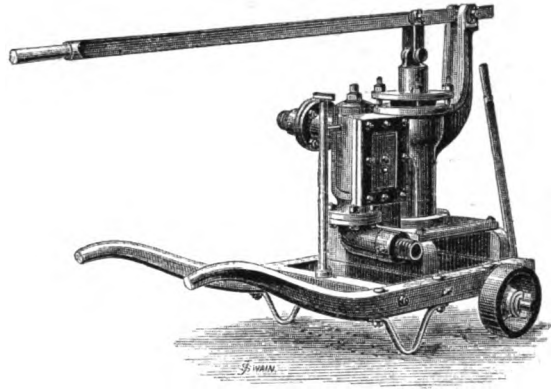
AND EVERY DESCRIPTION OF HYDRAULIC WORK.

Fig. 12 represents a Portable Pump for use in Boiler Proving, and other purposes where a high pressure is required.

We make them in five sizes and for two pressures, and they can be fitted with or without Barrow and Tank as required. Prices include Gauge and connecting Tube.

Diameter of Ram	1"	1½"	2"	3"	4"
Price for 200 lb. pressure	£6	£9	£14	£16	£18
Price for 600 lb. pressure	£8	£12	£18	"	"
Extra for Tank..	20/0	30/0	35/0	50/0	60/0
Extra for Barrow	20/0	30/0	30/0	40/0	40/0

FIG. 12.



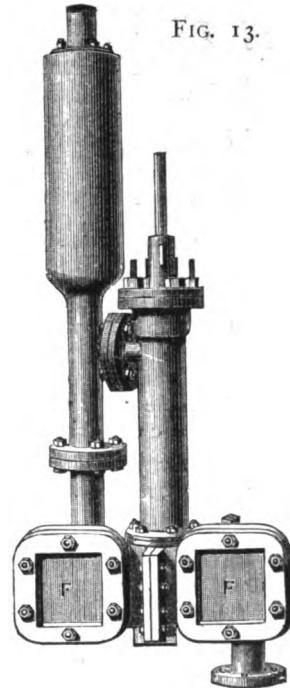
The two largest sizes are made in cast iron, with gun-metal valve and seats.

DEEP WELL PUMPS

Fig. 13 represents one type of Deep Well Pump, with Single Barrel ; but we manufacture every variety of these Pumps, Single, Double, and Treble Barrels, either in iron or gun metal, having superior facilities for the execution of this class of work. We also supply Slings, Guides, Rods to couple up to any length, Crank Shafts and Frames for hand, steam, wind, or horse power, and every description of accessories connected with Pumps.

FIG. 13.

Diameter of Barrel	3"	3½"	4"	5"	6"	7"
Stroke of Pump	9"	12"	12"	12"	15"	15"
	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.
Price of Single Barrel, Iron	6 10	7 10	9 0	12 10	17 0	19 10
" " " Brass	8 10	10 10	12 10	17 0	24 0	33 0
Price of Double Barrel, Iron	12 10	14 10	17 10	24 0	33 0	38 10
" " " Brass	16 10	20 10	24 0	33 0	47 10	64 0
Price of Treble Barrel, Iron	18 0	22 0	26 0	35 0	48 0	57 0
" " " Brass	24 0	30 0	35 0	48 0	70 0	95 0



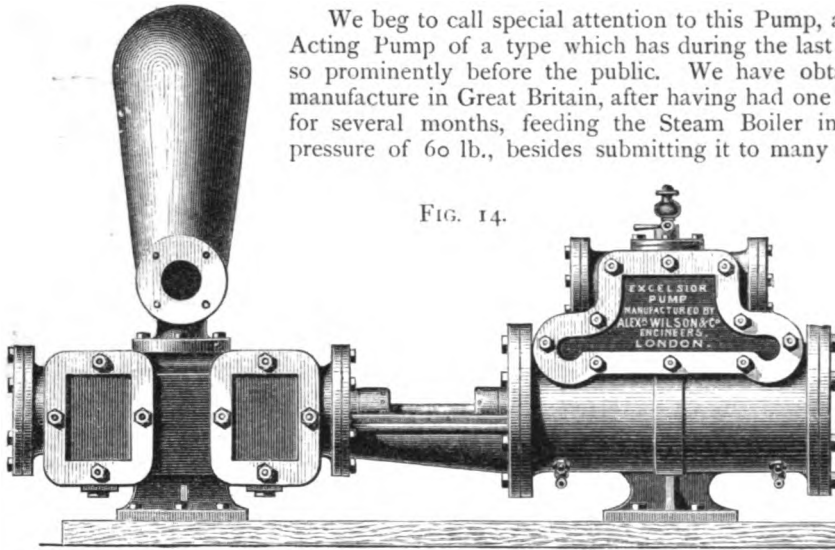
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D

PATENT "EXCELSIOR" DIRECT-ACTING STEAM PUMP.

CHEAP AND EFFECTIVE. DURABLE AND ECONOMICAL.



We beg to call special attention to this Pump, as being the best Direct-Acting Pump of a type which has during the last few years been brought so prominently before the public. We have obtained the sole right of manufacture in Great Britain, after having had one of them in regular work for several months, feeding the Steam Boiler in our own Works at a pressure of 60 lb., besides submitting it to many other severe tests. We

have in our possession numerous testimonials as to its valuable qualities from parties in America, who have been using it for the last four years, the manufacturer there being Mr. Corliss, the well-known inventor of the "Corliss" Engine, and we have every confidence in recommending it to our friends as a reli-

able Pump. We are already fixing them in this country, and will publish testimonials of their working shortly; meanwhile we call attention to the guarantee given with each Pump.

Guaranteed to start at any point in its stroke, and works with such accuracy as can only be obtained from a Crank, therefore wastes no steam at ends of Cylinder.

Its working parts are few and simple, and cannot get out of order.

All working parts are covered, and cannot be broken.

Has no outside or complex gear whatever.

Can be arranged to work in any position, vertical or horizontal, and even under water, in an emergency.

Has no dead point in its stroke.

Will discharge the water of condensation.

Is double acting—throwing a continuous stream.

Its working parts can readily be examined by simply removing the cover.

Can be looked after by a labourer.

Can run at any speed, fast or slow, and work at any pressure of steam with a steadiness unsurpassed.

Will work with compressed air, or by vacuum.

Reliable in its working. Wastes no steam, the valves being ordinary slide valves.

Has a clear exhaust, and the valve motion is guaranteed positive under any pressure.

All Pumps are tested with Steam and Water before leaving the Works, and are of the best Materials and Workmanship.

N.B.—These Pumps having stood the most severe tests, and merited unqualified approval, we warrant every Pump leaving our Works, and in case it does not fulfil the terms of our guarantee, the money will be refunded.

This Pump can be applied as a Deep Well Pump, either by placing it down the Well, within 20 feet of the water, and leading steam down to it, or by working it vertically, with the Piston Rod connected to the Plunger with any length of Connecting Rod.

ALEX. WILSON AND CO.,

ENGINEERS, VAUXHALL IRON-WORKS, NINE ELMS, LONDON, S.W.

DIMENSIONS AND PRICES OF "EXCELSIOR" STEAM PUMPS.

Diam. of Steam Cylinder ... Inches	*4	4	4	5	*5	5	5	6	*6	6	6	7	*7	7	8	*8	8	10	10	12	14	14
Diam. of Water Cylinder ..	2½	3	4	2½	3	4	5	3	4	5	6	4	5	6	4	5	6	7	6	7	8	
Length of Stroke ..	9	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	18	18	18	18	
Approximate Gallons Delivered per Hour }	1380	1950	3400	1380	1950	3400	5300	1950	3400	5300	7900	3400	5300	7900	3400	5300	7900	10500	7900	10500	14130	
Diam. of Steam Pipe .. Inches	2	2	2	1	1	1	1	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	2	2	2½	2½	
Diam. of Exhaust Pipe ..	1	1	1	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	2	2	2	2½	2½	2½	3	
Diam. of Water Pipes ..	2	2½	3	2	2½	3	3½	2½	3	3½	4	3	3½	4	3	3½	4	5	4	5	6	
Nom. Horse-power of Boiler required	1	1	1	1½	1½	1½	2	2	2	2	2	2½	2½	2½	3½	3½	3½	5	5	7	10	
PRICE IN LONDON .. £	20	22	25	23	24	27	32	28	32	36	40	36	40	44	38	43	48	56	64	75	85	95

• All marked thus are suitable for feeding Boilers, and for all sizes below those quoted we recommend our "VAUXHALL" Donkey-Pumps.

Special attention is called to the LONG STROKES, and the large *area of Water Valves and Pipes* which we adopt.

As these Pumps can be adapted to any use to which steam-driven Pumps can be applied; special Designs and Quotations will be given for any required purpose, with any combination of Steam and Water Cylinder, and any length of Stroke. Brass Liners, Governors, &c., extra.

NOTE.—Intending purchasers will please send the following information with order. Total height of Lift; Depth from which Water has to be drawn; Gallons to be delivered per hour; class of work to be done; pressure of Steam in Boiler, if already erected; how far Pump will be placed from Boiler, and length of Suction Pipe.

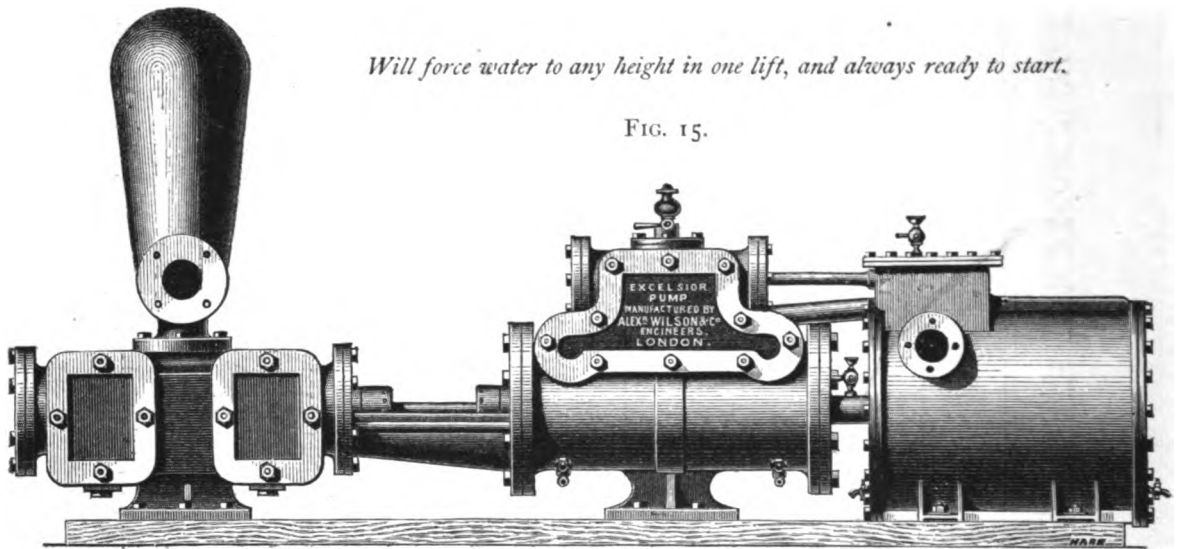
Used by the Pacific Mail Steam-Ship Company, the Northern Transportation Company, Alaska Fur Company's Steamers, Stockton Line of Steamers, the Steam Ships 'Empire,' 'C. M. Hutchinson,' 'Coquille,' 'Monteredy,' &c.

ALEX. WILSON AND CO.,

ENGINEERS, VAUXHALL IRON-WORKS, NINE ELMS, LONDON, S.W.

PATENT "EXCELSIOR" COMPOUND PUMPING ENGINES.

As public attention is now strongly directed towards the vital question of reducing the consumption of fuel for generating steam, and the economical use of same, we feel assured, in drawing attention to the Patent Excelsior Compound Pump, that we supply a want long felt, viz. an economical, reliable, and durable Pumping Engine, at a moderate prime cost. Direct-Acting Steam Pumps, not working steam expansively, but for the full length of their stroke, are not economical for Pumps of a large capacity, and necessarily waste power, which, if worked expansively in a second or low-pressure cylinder, would develop an effective additional pressure, equal to from 30 to 50 %, according to the ratio of expansion. In compounding our High-Pressure Cylinder, we claim to accomplish this great saving at a comparatively trifling expense, both of money and space, the Low-Pressure Cylinder being of the simplest and most compact design. *And we would impress the fact* that this additional cost is in a great measure compensated for by the SAVING of COST in the BOILER; the Compound Engine requiring less steam than the simple High-Pressure Engine for the performance of the same duty, and a proportionately smaller boiler is required. We therefore recommend the compounding of all Pumps above 7" for all general purposes, as the total length of the Excelsior Compound Steam-Pump is very little more than that of Direct-Acting Steam Pumps of the piston-valve class, and the saving in working expenses will pay for the entire Pump in a very short time.



Will force water to any height in one lift, and always ready to start.

FIG. 15.

Works Steam expansively. Wastes no Steam in any of its functions. Compact and Durable. Has plain Slide Valves, easily got at. Has no Dead Point in its Stroke.

Special Pump Valves and Seats for heavy pressures. All Pump Valves independent of each other. Both Pistons can be removed without disturbing the Engine.

ALEX. WILSON AND CO.,
ENGINEERS, VAUXHALL IRON-WORKS, NINE ELMS, LONDON, S.W.

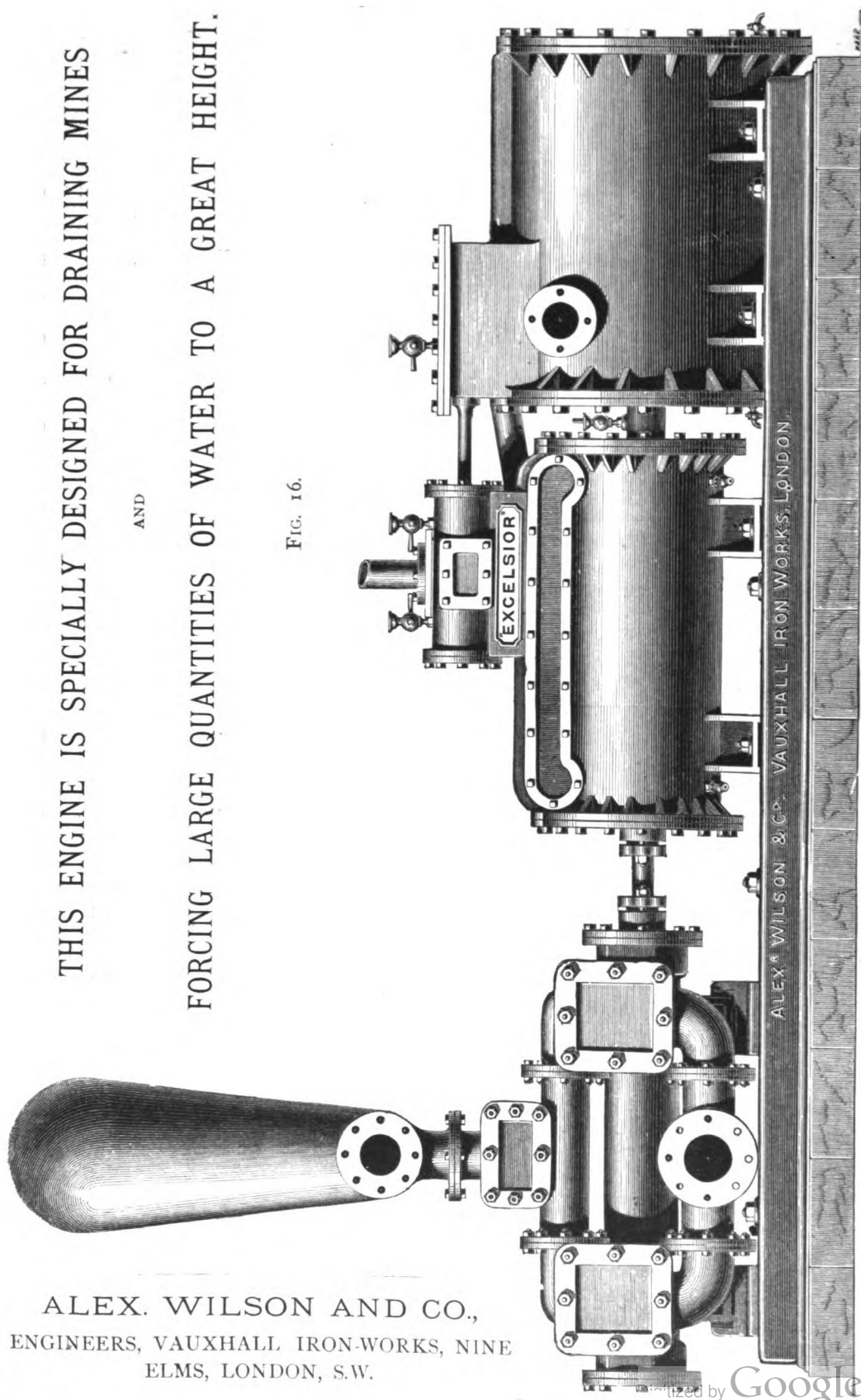
LIST CONTINUED, FOR HIGH LIFTS.

Diam. of High-Pressure Cylinder ..	Inches
" Low-Pressure Cylinder ..	" "
" Water Cylinder ..	" "
Length of Stroke ..	" "
Approximate Gallons delivered per Hour ..	" "
Diameter of Steam Pipe ..	Inches
" Exhaust Pipe ..	" "
" Water Pipes ..	" "
Nominal H. P. of Boiler required when working at 60 lb. Steam Pressure ..	" " " " "
Price in London ..	" " " " "

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THIS ENGINE IS SPECIALLY DESIGNED FOR DRAINING MINES
AND
FORCING LARGE QUANTITIES OF WATER TO A GREAT HEIGHT.

FIG. 16.



ALEX. WILSON AND CO.,
ENGINEERS, VAUXHALL IRON-WORKS, NINE
ELMS, LONDON, S.W.

THE PATENT "EXCELSIOR" COMPOUND PUMPING ENGINE,

Shown on the opposite page, is specially designed for draining mines and for use as a Water-Works Engine for High Duty and Heavy Lifts, doing away with all the expensive drawbacks to the Cornish Engine, viz. : Prime cost, massive foundations, heavy connecting rods and plungers, and expensive Boiler houses, and yet indicating a duty that will compare favourably with it. Can be placed at the bottom of a mine, and leaves a clear shaft.

In case of a new shaft being sunk, the Pump can be lowered and worked at an increased steam pressure. When placed in a new mine, care should be taken to allow for working at a low pressure, so that the Pump may be lowered to each successive level as work is completed, and so increase duty ; being compact on one bed plate, and requiring no foundation, this can be accomplished involving little expense and labour.

The Low-Pressure Engines are Steam-jacketed, and a Retaining Valve placed in all Pumps for High Lifts.

Used by the Phoenix, Excelsior, Carroforths, Gover, and a hundred other Mines, Collieries, &c.

THE PATENT "EXCELSIOR" DIRECT-ACTING STEAM PUMPS

Are extensively in use in Mines, Water Works, Railways, Steam Ships, Irrigation Works, Feeding Boilers, Raising Sunken Vessels, Working Accumulators for Hydraulic Machinery, Cranes, Riveters, &c., and in Manufactories of every description.

We wish to draw the special attention of Steam-Ship Owners to its practical and proved utility as a Circulating Pump for Surface Condensers, also as an independent Feed Pump for the Boilers. We also call the attention of the following Manufacturers, &c., this Pump being designed, in its various modifications, to suit the wants of each.

BLEACHERS,
WRECKERS,
PLANTERS,
CHEMICAL MANUFACTURERS,

SUGAR REFINERS,
CONTRACTORS,
TANNERS,
SOAP MANUFACTURERS,

BREWERS,
OIL REFINERS.
QUARRY PUMPS,
LOCOMOTIVE PUMPS.

This Pump can be applied as a Deep Well Pump, either by placing it down the Well, within 20 feet of the water, and leading steam down to it, or by working it vertically, with the Piston Rod connected to the Plunger with any length of Connecting Rod.

Used by the Central Pacific Railroad Company, Southern Pacific Railway, Northern Pacific Railway.

Used and recommended by the Risdon Iron and Locomotive Works ; Fulton Foundry ; Hinckley and Co. ; Deacon and Bulger ; Portland Boiler Company ; James Craig, Esq., M.I.C.E. ; Charles Elliot, Superintendent, Spring Valley Water-Works, &c.

ALEX. WILSON AND CO.,
ENGINEERS, VAUXHALL IRON-WORKS, NINE ELMS, LONDON, S.W.

VERTICAL ENGINES.

We manufacture every description of Combined Vertical Engine and Boiler—Single and Double Cylinder—with and without Reversing Gear. Fig. 17 represents a Double-Cylinder Engine, 5 inches diameter, $7\frac{1}{2}$ inch stroke, fitted with Reversing Gear, which was constructed for Messrs. Siemens Bros., Charlton, for Telegraph Cable winding purposes. Similar Engines have been supplied for the same purpose to the Indiarubber, Guttapercha, and Telegraph Works Company, Silvertown. Quotations given for Special Engines not in Lists.

FIG. 17.

PRICE LIST OF COMBINED VERTICAL BOILER AND ENGINE.

SINGLE CYLINDERS.

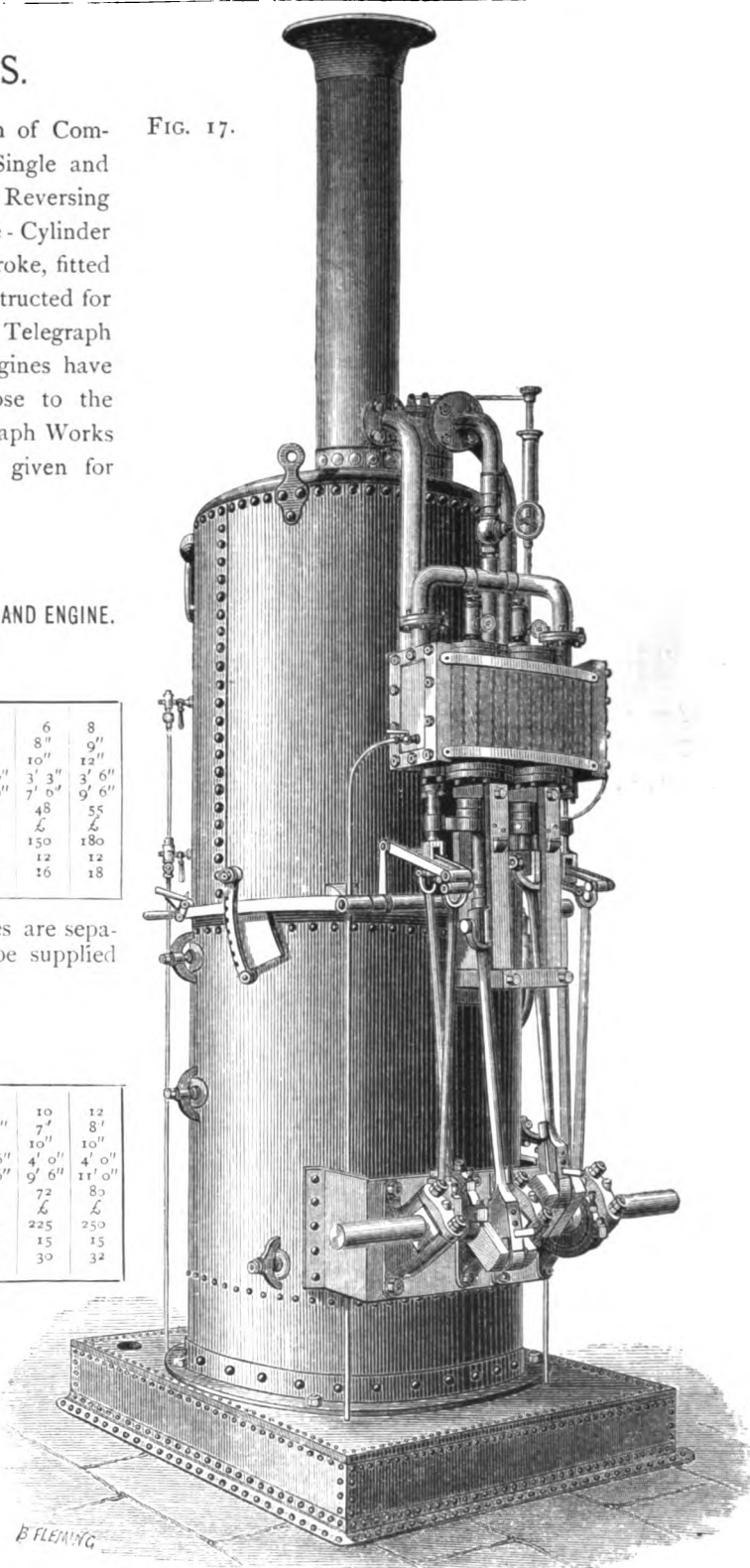
Nominal Horse-power	2½	3	4	5	6	8
Diameter of Cylinders	5"½	5½"	6½"	7"	8"	9"
Stroke	7½"	7½"	9"	10"	10"	12"
Diameter of Boiler ..	2' 6"	2' 6"	2' 9"	3' 0"	3' 3"	3' 6"
Height of Boiler ..	5' 6"	6' 0"	6' 6"	7' 0"	7' 6"	9' 6"
Approx. Weight cwt.	22	26	34	40	48	55
Price, including Feed Pump	75	85	105	125	150	180
Extra for Governor ..	8	8	10	10	12	12
Extra for Reversing Gear	12	12	14	15	16	18

The Frames of the above Engines are separate from Boiler, but they can also be supplied similar to woodcut.

DOUBLE CYLINDERS.

Nominal Horse-power	5	6	7	8	10	12
Diameter of Cylinder	5"½	5½"	6"	6½"	7"	8"
Stroke	7½"	7½"	9"	9"	10"	10"
Diameter of Boiler ..	3' 0"	3' 3"	3' 3"	3' 6"	4' 0"	4' 0"
Height of Boiler ..	7' 0"	7' 6"	8' 6"	9' 6"	9' 6"	11' 0"
Approx. total weight cwt.	40	48	55	62	72	80
Price, including Feed Pump	130	155	175	190	225	250
Extra for Governor ..	10	12	12	12	15	15
Extra for Reversing Gear	24	24	26	28	30	32

The Frames of the above Engines are separate from the Boilers, but they can also be supplied similar to woodcut, where lightness is a consideration.

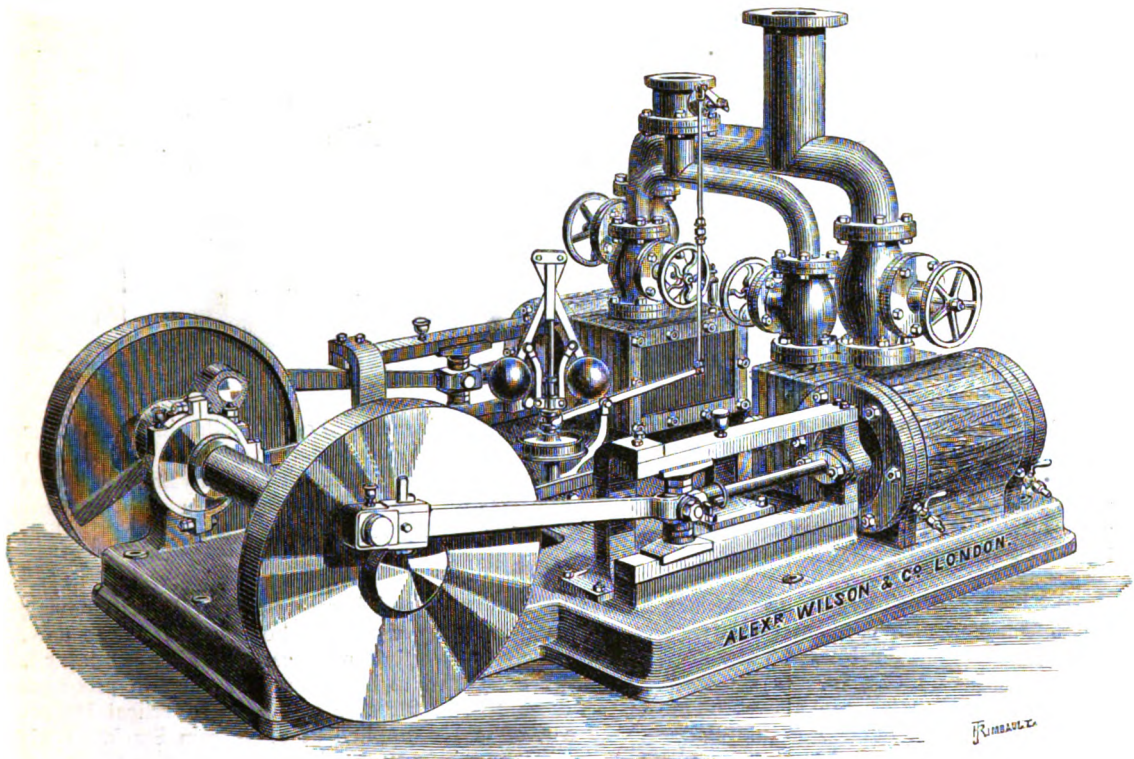


ALEX. WILSON AND CO.,
ENGINEERS, VAUXHALL IRON-WORKS, NINE ELMS, LONDON, S.W.

HORIZONTAL ENGINES

OF SPECIAL DESIGN.

FIG. 18.



We manufacture every description of Horizontal Engine—Single or Double Cylinder—with and without Reversing Gear. Fig. 18 represents a Double-Cylinder Engine, designed for a special purpose, several sizes of which we have constructed for one of the most eminent Engineering Firms in this country. Prices given below are for Engines of ordinary type. Quotations given for Special Engines not specified in following Table.

PRICE LIST OF HORIZONTAL STEAM-ENGINES.

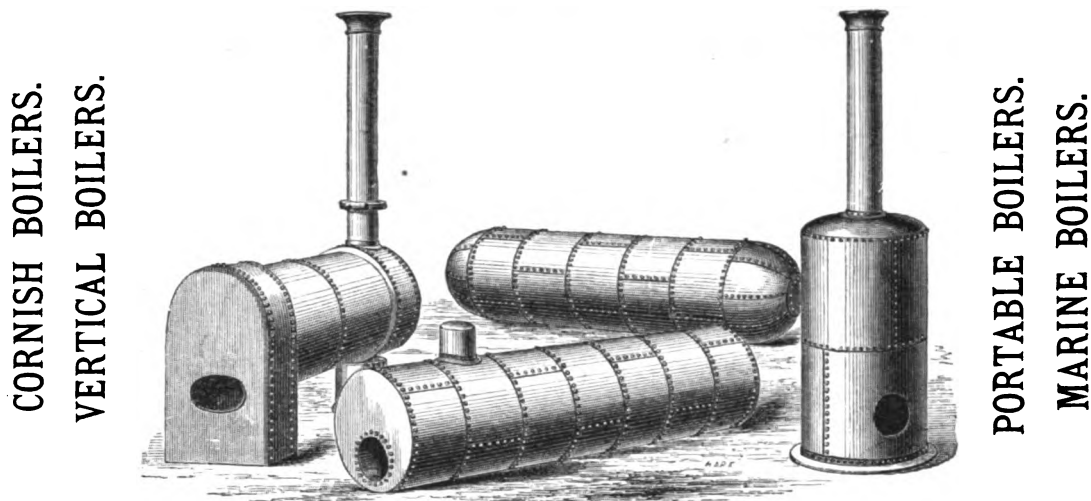
Nominal Horse-power	2½	3½	4	5	6	8	10	12	14	16
Diameter of Cylinder Inches	5	6	6½	7	8	9	10	11	12	14
Length of Stroke	7½	9	10	10	10	12	14	16	16	18
Price of Engine	£28	£36	£42	£52	£66	£84	£105	£120	£130	£160
Extra if fitted with Governor	8	8	10	10	12	12	14	14	15	15
Extra if fitted with Feed Pump	4	5	5	6	7	7	8	9	9	12
Extra if fitted with Expansion Valves ..	6	6	6	6	8	9	10	12	15	15
Extra if fitted with Reversing Gear ..	12	13	14	15	16	18	20	22	24	27

For Coupled Engines of the above sizes, and double the power, the Prices are to be taken as twice those given in the above Table.

ALEX. WILSON AND CO.,
ENGINEERS, VAUXHALL IRON-WORKS, NINE ELMS, LONDON, S.W.

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FIG. 19.



In compiling the Tabular Price Lists of Boilers, which follow on the five following pages, we believe we are justified in saying that such complete Boiler Price Lists have never before been compiled by any other Firm in the trade, and that it supplies a want long felt by many Engineers who do not manufacture their own Boilers, as by filing our Lists for convenient reference a great amount of correspondence will be saved, the dimensions, quality of plates, weights, and prices of the leading types of Boilers being seen at a glance.

We have adopted certain proportions for the various types and horse-powers of Boilers, having taken, as a general rule, about 10 square feet of heating surface per nominal horse-power, as the unit, except in regard to the Return Tube Boilers, where a greater proportion of heating surface is adopted. Having adopted these sizes as standard ones, we are enabled to keep many of them in progress, so that quick dispatch can always be given to orders, and in the case of the small vertical Boilers and Six and Eight horse Portable Boilers, they can often be supplied at once from Stock. With uniform dimensions, and the repetition of these dimensions, we have also been enabled to reduce the cost, and at the same time improve the quality of the workmanship, by having a complete set of templates and mould blocks for all the flanged plates of the various sizes, which gives greater precision to the operations of the workmen, and leaves nothing to the old system of rule of thumb. The quality of plates used, where "Lowmoor, or equal quality," is not specified, is invariably Staffordshire, as the plates made in that district are more reliable for Boiler-making purposes than those made from the cheaper irons of other districts, though the latter may apparently have an equal tensile strength.

The use of angle iron is avoided wherever possible, and the plates flanged instead, as that is of itself a good test of the quality of the plate.

Every Boiler is tested by hydraulic pressure to about double the working pressure, and the smaller ones with steam to about 50 per cent. above the working pressure, so that they can always be depended on as being perfectly tight before leaving the Works.

Delivery is made free in London, Liverpool, Hull, or any intermediate Railway Station, and the Prices are net, and subject to alteration according to the Price of iron. The Prices are calculated on the basis of Staffordshire marked bars, at £11 per ton, and for guidance they would fluctuate about 2½ per cent. for every 20s. rise or fall.

ALEX. WILSON AND CO.,

ENGINEERS, VAUXHALL IRON-WORKS, NINE ELMS, LONDON, S.W.

CORNISH BOILERS.

Nominal Horse-power	2	4	6	8	10	12	14	16	18	20	25	30
Diameter	2 ft. 9 in.	3 ft. 9 in.	4 ft. 3 in.	4 ft. 4 in.	4 ft. 4 in.	4 ft. 8 in.	4 ft. 9 in.	4 ft. 9 in.	5 ft. 0 in.	5 ft. 6 in.	5 ft. 6 in.	6 ft. 0 in.
Length	6 ft. 0 in.	7 ft. 6 in.	10 ft. 0 in.	13 ft. 0 in.	14 ft. 0 in.	15 ft. 0 in.	16 ft. 0 in.	17 ft. 6 in.	18 ft. 0 in.	19 ft. 0 in.	25 ft. 0 in.	26 ft. 0 in.
Diameter of Flue	1 ft. 3 in.	2 ft. 0 in.	2 ft. 2 in.	2 ft. 2 in.	2 ft. 2 in.	2 ft. 4 in.	2 ft. 4 in.	2 ft. 6 in.	2 ft. 9 in.	1 ft. 9 in.	1 ft. 9 in.	2 ft. 0 in.
Diameter of Dome	1 ft. 0 in.	1 ft. 3 in.	1 ft. 6 in.	1 ft. 6 in.	1 ft. 9 in.	1 ft. 9 in.	1 ft. 9 in.	1 ft. 9 in.	2 ft. 0 in.	2 ft. 3 in.	2 ft. 3 in.	2 ft. 6 in.
Height of Dome	1 ft. 0 in.	1 ft. 6 in.	1 ft. 9 in.	1 ft. 9 in.	2 ft. 0 in.	2 ft. 0 in.	2 ft. 0 in.	2 ft. 6 in.	2 ft. 6 in.	2 ft. 6 in.	2 ft. 6 in.	3 ft. 0 in.
Thickness and Quality of Shell	$\frac{5}{16}$ B	$\frac{3}{8}$ B	$\frac{3}{8}$ B	$\frac{3}{8}$ B	$\frac{3}{8}$ B	$\frac{3}{8}$ B	$\frac{3}{8}$ B	$\frac{3}{8}$ B	$\frac{3}{8}$ B	$\frac{7}{16}$ B	$\frac{7}{16}$ B	$\frac{7}{16}$ B
Ditto ditto Flue	$\frac{1}{4}$ BB	$\frac{3}{8}$ BB	$\frac{3}{8}$ BB	$\frac{3}{8}$ BB	$\frac{3}{8}$ BB	$\frac{3}{8}$ BB	$\frac{3}{8}$ BB	$\frac{3}{8}$ BB	$\frac{3}{8}$ BB	$\frac{7}{16}$ BB	$\frac{7}{16}$ BB	$\frac{7}{16}$ BB
Ditto ditto Ends	$\frac{3}{8}$ BB	$\frac{1}{2}$ BB	$\frac{1}{2}$ BB	$\frac{1}{2}$ BB	$\frac{1}{2}$ BB	$\frac{1}{2}$ BB	$\frac{1}{2}$ BB	$\frac{1}{2}$ BB	$\frac{1}{2}$ BB	$\frac{5}{8}$ BB	$\frac{5}{8}$ BB	$\frac{5}{8}$ BB
Ditto ditto Dome	$\frac{5}{16}$ BB	$\frac{3}{8}$ BB	$\frac{3}{8}$ BB	$\frac{3}{8}$ BB	$\frac{3}{8}$ BB	$\frac{3}{8}$ BB	$\frac{3}{8}$ BB	$\frac{3}{8}$ BB	$\frac{3}{8}$ BB	$\frac{3}{8}$ BB	$\frac{3}{8}$ BB	$\frac{7}{16}$ BB
Approximate Weight of Boiler in cwt.	16	25	36	45	50	62	66	70	90	115	140	180
Price of Boiler, as specified above	£ 22	£ 47	£ 68	£ 78	£ 85	£ 100	£ 110	£ 122	£ 137	£ 180	£ 220	£ 285
Extra for Furnace Fittings	£ 3 10	£ 4 10	£ 5 0	£ 5 0	£ 5 5	£ 5 10	£ 5 15	£ 6 0	£ 7 0	£ 9 0	£ 9 0	£ 10 0
Ditto Galloway Tubes, each	2 0	2 15	3 0	3 0	3 0	3 10	3 10	3 15	4 0	2 15	2 15	2 15
Ditto Mountings	6 10	7 10	8 0	8 0	10 0	12 0	14 0	16 0	18 0	20 0	25 0	30 0
Hydraulic Test, per square inch	150	150	130	130	120	120	120	120	120	120	120	120

In every case Low Moor, or equal quality, Plates are put over the fire in the Flues. All the End Plates are flanged into Shell. All Shells over 5 feet diameter are double riveted on longitudinal seams. The last three sizes have two Flues each.

Mountings include Safety Valve, Stop Valve, Check Valve, Pressure Gauge, Water Gauge, Gauge Cocks, and Blow-off Cock. Furnace Fittings include Furnace Front, Dead Plate, Fire Bars, and Bridge.

In the above and following Tables, "B" indicates "Staffordshire Best," and "BB" "Staffordshire Best Best" Plates. "LM" indicates "Low Moor," "Bowling," or "Farnley" Plates.

ALEX. WILSON AND CO.,

ENGINEERS, VAUXHALL IRON-WORKS, NINE ELMS, LONDON, S.W.

VERTICAL TUBULAR BOILERS.

Nominal Horse-power	2	3	4	5	6	7	8	9	10	11	12
Diameter of Shell	2 6	2 6	2 9	3 0	3 3	3 3	3 6	3 9	4 0	4 0	4 0
Height of ditto	5 0	6 0	6 6	7 0	7 6	8 6	8 6	9 0	9 6	10 0	11 0
Diameter of Fire Box	2 0 1/2	2 0 1/2	2 3 1/2	2 6 1/2	2 8 1/2	2 8 1/2	2 11 1/2	3 2 1/2	3 5 1/2	3 5 1/2	3 5 1/2
Height of ditto	2 6	3 0	3 0	3 6	3 6	3 6	3 6	4 0	4 0	4 0	4 0
Number of Tubes	12	14	16	18	20	22	25	27	30	27	30
Diameter of ditto	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2
Thickness and quality of Shell	in. 1 1/8 B	in. 1 1/8 B	in. 1 1/8 B	in. 1 1/8 B	in. 1 1/8 B	in. 1 1/8 B	in. 1 1/8 B	in. 1 1/8 B	in. 1 1/8 B	in. 1 1/8 B	in. 1 1/8 B
Ditto ditto Crown	1 7/8 BB	1 7/8 BB	1 7/8 BB	1 7/8 BB	1 7/8 BB	1 7/8 BB	1 7/8 BB	1 7/8 BB	1 7/8 BB	1 7/8 BB	1 7/8 BB
Ditto ditto Fire Box	3/8 BB	3/8 BB	3/8 BB	3/8 BB	3/8 BB	3/8 BB	3/8 BB	3/8 BB	3/8 BB	3/8 BB	3/8 BB
Ditto ditto Tube Plate	1 7/8 BB	1 7/8 BB	1 7/8 BB	1 7/8 BB	1 7/8 BB	1 7/8 BB	1 7/8 BB	1 7/8 BB	1 7/8 BB	1 7/8 BB	1 7/8 BB
Approximate weight of Boiler in cwt.	9	12	17	20	24	27	30	34	37	40	44
Price of Boiler, as specified above	£ 17 0	£ 21 0	£ 26 0	£ 32 0	£ 38 0	£ 44 0	£ 51 0	£ 55 0	£ 58 0	£ 63 0	£ 70 0
Extra for Fire Box of Lowmoor	3 0	3 10	4 0	4 10	5 0	5 0	5 10	6 10	7 10	7 10	7 10
Ditto Ashpit	2 0	2 0	2 10	2 15	3 5	3 5	3 10	3 15	4 0	4 0	4 0
Ditto Fire Bars	1 0	1 0	1 5	1 7/6	1 12/6	1 12/6	2 5	2 10	2 15	2 15	2 15
Ditto Base Plate	1 10	1 10	2 0	2 5	2 10	2 10	3 0	3 5	3 10	3 10	3 10
Ditto Smoke Box and Funnel	2 15	2 15	3 5	3 15	4 0	4 0	4 15	5 10	6 5	6 5	6 5
Ditto Mountings	6 10	6 10	7 10	7 10	8 0	8 0	8 0	9 0	10 0	11 0	12 0
Hydraulic Test, per square inch	150	150	150	140	140	140	140	140	130	130	130

Mountings include Safety Valve, Stop Valve, Check Valve, Pressure Gauge, Water Gauge, Gauge Cocks, and Blow-off Cock.

Fire Door is included in price of Boiler.

"B" indicates "Staffordshire Best," and "BB" "Staffordshire Best Best" Plates.

ALEX. WILSON AND CO.,
ENGINEERS, VAUXHALL IRON-WORKS, NINE ELMS, LONDON, S.W.

VERTICAL CROSS TUBE BOILERS.

	2	3	4	5	6	7	8	9	10	11	12
Nominal Horse-power	..	..	..	..	..	..	..	..	..	..	..
Diameter of Shell	2 6	2 6	2 9	3 3	3 3	3 3	3 3	3 9	4 0	4 0	4 0
Height of ditto	5 0	6 0	6 6	7 0	7 6	8 6	8 6	9 0	9 6	10 0	11 0
Diameter of Fire Box	2 0 1/2	2 0 1/2	2 3 1/2	2 6 1/2	2 8 1/2	2 8 1/2	2 11 1/2	3 2 1/2	3 5 1/2	3 5 1/2	3 5 1/2
Height of ditto	3 6	3 9	4 0	4 6	4 9	5 0	5 6	6 0	6 3	6 6	7 0
Number of Cross Tubes	1	2	2	2	3	3	4	4	5	5	6
Diameter of ditto	0 6	0 7	0 8	0 8	0 8	0 8	0 8	0 8	0 8	0 8	0 8
Diameter of Up-take	0 7	0 7	0 8	0 8	0 8	0 8	0 9	0 9	0 10	0 10	0 10
Length of Chimney	4 0	4 0	4 0	4 6	5 0	5 0	5 6	5 6	6 0	6 0	7 0
Thickness and Quality of Shell	1 1/8 B	1 1/8 B	1 1/8 B	1 1/8 B	1 1/8 B	1 1/8 B	1 1/8 B	1 1/8 B	1 1/8 B	1 1/8 B	1 1/8 B
Ditto ditto Fire Box	1 1/8 BB	1 1/8 BB	1 1/8 BB	1 1/8 BB	1 1/8 BB	1 1/8 BB	1 1/8 BB	1 1/8 BB	1 1/8 BB	1 1/8 BB	1 1/8 BB
Ditto ditto Cross Tubes	1 1/8 BB	1 1/8 BB	1 1/8 BB	1 1/8 BB	1 1/8 BB	1 1/8 BB	1 1/8 BB	1 1/8 BB	1 1/8 BB	1 1/8 BB	1 1/8 BB
Ditto ditto Up-take	1 1/8 BB	1 1/8 BB	1 1/8 BB	1 1/8 BB	1 1/8 BB	1 1/8 BB	1 1/8 BB	1 1/8 BB	1 1/8 BB	1 1/8 BB	1 1/8 BB
Ditto ditto Crowns	1 1/8 BB	1 1/8 BB	1 1/8 BB	1 1/8 BB	1 1/8 BB	1 1/8 BB	1 1/8 BB	1 1/8 BB	1 1/8 BB	1 1/8 BB	1 1/8 BB
Approximate Weight of Boiler in cwt.	9	12	17	20	24	27	30	34	37	40	44
Price of Boiler, as specified above	£ 21 0	£ 27 0	£ 36 0	£ 42 0	£ 50 0	£ 57 0	£ 62 0	£ 70 0	£ 75 0	£ 82 0	£ 89 0
Extra for Fire Box of Lowmoor	3 15	4 0	5 0	5 10	6 0	6 10	7 0	8 10	10 5	11 0	12 0
Ditto Cross Tubes of Lowmoor	0 10	1 0	1 5	1 10	2 5	2 5	3 5	3 15	5 0	5 0	6 0
Ditto Ashpit	2 0	2 0	2 10	2 15	3 5	3 5	3 10	3 15	4 0	4 0	4 0
Ditto Base Plate	1 10	1 10	2 0	2 5	2 10	2 10	3 0	3 5	3 10	3 10	3 10
Ditto Fire Bars	1 0	1 0	1 5	1 7/6	1 12/6	1 12/6	2 0	2 10	2 15	2 15	2 15
Ditto Mountings	6 10	6 10	7 10	7 10	8 0	8 0	8 0	9 0	10 0	11 0	12 0
Hydraulic Test, per square inch	150	150	150	140	140	140	140	140	130	130	130

Mountings include Safety Valve, Pressure Gauge, Water Gauge, Gauge Cocks, Check Valve, Stop Valve, and Blow-off Cock.

Fire Door is included in price of Boiler.

"B" indicates "Staffordshire Best," and "BB" Staffordshire Best Best" Plates.

ALEX. WILSON AND CO.,

ENGINEERS, VAUXHALL IRON-WORKS, NINE ELMS, LONDON, S.W.

PORTABLE BOILERS.

Nominal Horse-power	2	4	6	8	10	12	15	20	25	30
Size across Front	ft. in. 2 2	ft. in. 2 2	ft. in. 2 11	ft. in. 3 1	ft. in. 3 3	ft. in. 3 7	ft. in. 3 9	ft. in. 4 0	ft. in. 4 3	ft. in. 4 6
Width of Casing	1 9	1 11	2 0	2 4	2 6	2 10	3 0	3 6	4 0	4 3
Height of ditto	3 0	3 7	4 0	4 3	4 6	4 8	5 0	5 6	6 0	6 6
Length of Barrel	3 9	4 6	5 8	6 0	6 6	6 9	7 0	7 6	8 0	8 6
Diameter of ditto	1 9	2 2	2 6	2 8	2 9	3 0	3 3	3 7	3 9	4 0
Number of Tubes	12	18	24	28	32	33	40	46	52	60
Diameter of ditto	in. 2 1/2	in. 2 1/2	in. 2 1/2	in. 2 1/2	in. 2 1/2	in. 2 1/2	in. 2 1/2	in. 2 1/2	in. 2 1/2	in. 2 1/2
Thickness and Quality of Barrel	1/8 B	1/8 B	3/8 B	3/8 B	3/8 B	3/8 B	3/8 B	3/8 B	1/2 B	1/2 B
Ditto ditto	1/8 LM	1/8 LM	3/8 LM	3/8 LM	3/8 LM	3/8 LM	3/8 LM	3/8 LM	1/2 LM	1/2 LM
Ditto ditto	1/8 LM	1/8 LM	1/8 LM	1/8 LM	1/8 LM	1/8 LM	1/8 LM	1/8 LM	1/8 LM	1/8 LM
Ditto ditto	1/8 BB	1/8 BB	1/8 BB	1/8 BB	1/8 BB	1/8 BB	1/8 BB	1/8 BB	1/8 BB	1/8 BB
Ditto ditto	1/8 BB	1/8 BB	1/8 BB	1/8 BB	1/8 BB	1/8 BB	1/8 BB	1/8 BB	1/8 BB	1/8 BB
Ditto ditto	1/8 B	1/8 B	1/8 B	1/8 B	1/8 B	1/8 B	1/8 B	1/8 B	1/8 B	1/8 B
Approximate Weight of, in cwts.	15	23	28	33	42	50	59	71	85	90
Price of Boiler, as specified above	£ 35	£ 47	£ 58	£ 68	£ 79	£ 90	£ 115	£ 138	£ 160	£ 190
Extra for Asphalt	1 10	2 0	2 0	2 10	2 15	3 0	3 5	3 10	4 0	4 10
Ditto Chimney and Base	2 10	3 0	3 10	3 15	3 15	4 0	4 10	5 0	5 0	5 10
Ditto Fire Bars	1 0	1 10	1 15	2 0	2 5	2 15	3 0	3 10	4 0	4 10
Ditto Mountings	6 10	7 10	8 0	8 0	10 0	12 0	15 0	20 0	25 0	30 0
Hydraulic Test, per square inch	120	120	120	120	120	120	120	120	120	120

Mountings include Safety Valve, Stop Valve, Check Valve, Pressure Gauge, Water Gauge, Gauge Cocks, and Blow-off Cock. "B" indicates "Staffordshire Best," and "BB" "Staffordshire Best Best" Plates. "LM" indicates "Low Moor," or "Bowling," or "Farnley" Plates.

ALEX. WILSON AND CO.,

ENGINEERS, VAUXHALL IRON-WORKS, NINE ELMS, LONDON, S.W.

MARINE RETURN TUBE BOILERS.

Nominal Horse-power	5	6	7	8	10	12	14	15	16
Diameter of Boiler	ft. 4 0	ft. 4 0	ft. 4 0	ft. 4 6	ft. 5 0	ft. 5 0	ft. 5 6	ft. 5 6	ft. 5 6
Length of ditto	..	..	..	..	..	..	..	..	..
Diameter of Flue	..	..	..	..	..	..	..	..	..
Length of ditto	..	..	..	..	..	..	..	..	..
Diameter of Tubes	..	..	..	..	..	..	..	..	..
Number of ditto	No. 26	No. 28	No. 34	No. 34	No. 44	No. 44	No. 50	No. 50	No. 50
Depth of Combustion Chamber	..	..	..	..	..	..	..	..	..
Diameter of Dome	..	..	..	..	..	..	..	..	..
Height of ditto	..	..	..	..	..	..	..	..	..
Diameter of Funnel	..	..	..	..	..	..	..	..	..
Height of ditto	..	..	..	..	..	..	..	..	..
Thickness and Quality of Shell	..	..	..	..	..	..	..	..	..
Ditto	..	..	..	..	..	..	..	..	..
Ditto	..	..	..	..	..	..	..	..	..
Ditto	..	..	..	..	..	..	..	..	..
Ditto	..	..	..	..	..	..	..	..	..
Ditto	..	..	..	..	..	..	..	..	..
Approximate Heating Surface of Tubes	..	..	..	..	..	..	..	..	..
Ditto	..	..	..	..	..	..	..	..	..
Ditto	..	..	..	..	..	..	..	..	..
Ditto	..	..	..	..	..	..	..	..	..
Price of Boiler, as specified above	..	..	..	..	..	..	..	..	..
Extra for Furnace Fittings	..	..	..	..	..	..	..	..	..
Ditto Mountings	..	..	..	..	..	..	..	..	..
Hydraulic Test, per square inch	..	..	..	..	..	..	..	..	..

Mountings include Safety Valve, Spring Balances, Pressure Gauge, Water Gauge, Gauge Cocks, Check Valve, Blow-off and Scum Cocks. Smoke Box and Funnel are included in price of Boiler.

"B" indicates "Staffordshire Best," and "BB" "Staffordshire Best Best" Plates. "LM" indicates "Low Moor," Bowling, or "Farnley" Plates.

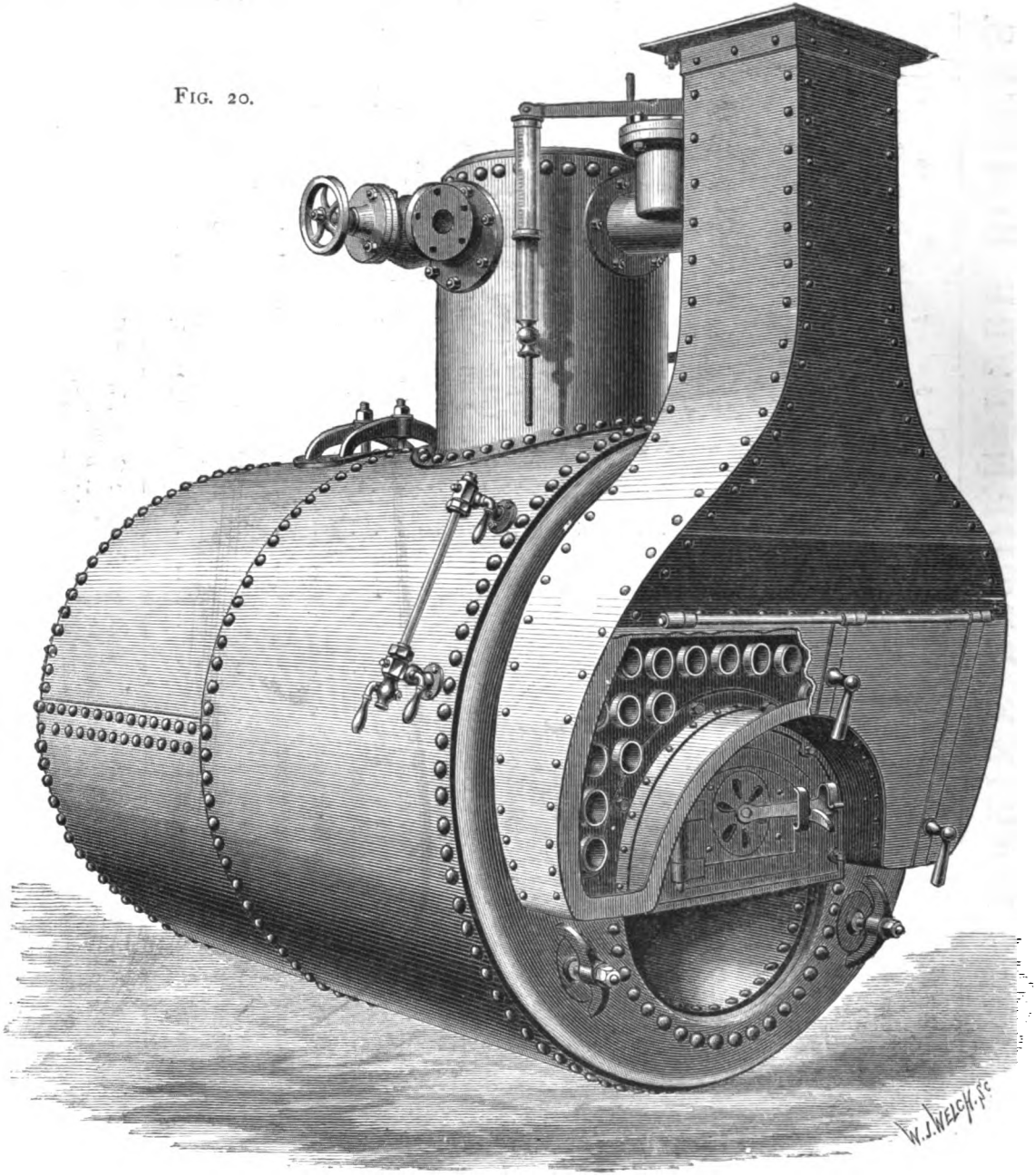
ALEX. WILSON AND CO.,

ENGINEERS, VAUXHALL IRON-WORKS, NINE ELMS, LONDON, S.W.

MARINE RETURN TUBE BOILER.

The annexed engraving, Fig. 20, represents a High-Pressure Return Tube Boiler, of 7 Horse-power, 4 feet 6 inches diameter and 6 feet long, as used for one of our Screw Engines. The wood-cut has been copied from a photograph, and is an accurate representation of the style of Boiler. For prices of these Boilers see Price List on previous page, and also the Tabular Price of our Screw Engines, Boilers, &c., pages 36 and 37.

FIG. 20.



ALEX. WILSON AND CO.,
ENGINEERS, VAUXHALL IRON-WORKS, NINE ELMS, LONDON, S.W.

SCREW PROPELLERS.

FIG. 21.

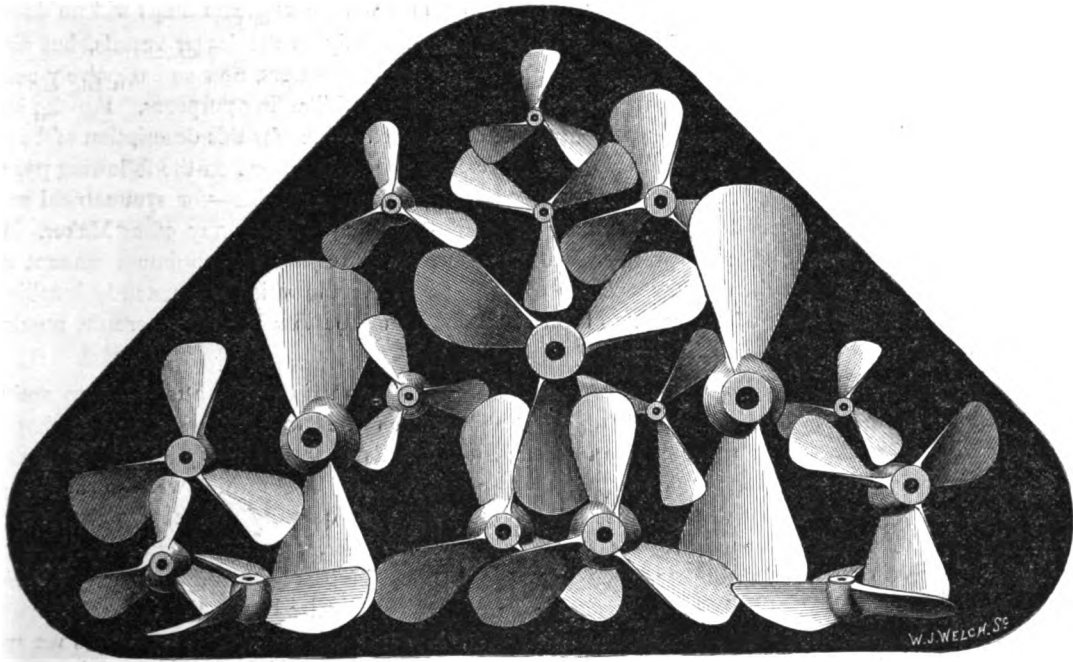


Fig. 21 represents a group of Two and Three-bladed Propellers, of which we have a large Stock of patterns of various diameters and pitches.

We supply them in Gun Metal, Cast Iron, Cast Malleable Iron, or Cast Steel, and they can be sent either bored to dimensions with Keyways cut or unbored. The following Table gives a few of the pitches and diameters which will serve as a guide, but we can supply any size up to 10 feet diameter, 2 blades, 3 blades, or 4 blades, true screws or with varying pitches. We can also supply Hirsch's and other patent Screws, prices for which, including Royalty, vary from £2 to £4 per nominal horse-power, but exact prices will be given on application.

Diameter	1' 9"	1' 11"	2' 0"	2' 2"	2' 2"	2' 3"	2' 6"	2' 9"	2' 9"	3' 0"	3' 6"	3' 6"	3' 9"	4' 0"	4' 6"	5' 4"
Pitch	3' 0"	3' 0"	3' 0"	3' 6"	5' 0"	4' 0"	3' 6"	3' 0"	4' 0"	5' 6"	5' 6"	6' 6"	5' 0"	5' 0"	7' 3"	9' 6"
Right or Left ..	L	L	L	L	L	R & L	R	R & L	L	R & L	L	L	L	L	R	R
No. of Blades ..	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2
Approx. Weight in lbs.	35	38	42	74	80	73	52	96	115	200	238	240	189	320	463	584
Price in Cast Iron	1 8	1 10	1 15	2 5	2 10	2 5	2 6	3 0	3 10	5 0	6 0	6 0	5 0	6 0	9 0	11 0
Price in Gun Metal	2 15	3 0	3 10	5 10	6 0	5 10	4 10	7 10	9 0	15 0	18 0	18 0	15 0	24 0	35 0	45 0

ALEX. WILSON AND CO.,

ENGINEERS, VAUXHALL IRON-WORKS, NINE ELMS, LONDON, S.W.

F

HIGH-PRESSURE SCREW ENGINES.

The great development of Steam Power during the last twenty years has in no department been more extensive than in that of our Mercantile Marine, and in a few years Steam Ships will no doubt monopolize the whole of the carrying trade. This applies not only to the larger vessels, but also to the great development of small vessels for the navigation of Inland waters, now so extensively used for purposes of pleasure as well as for carrying passengers and general Trading purposes. For the last seven years we have given great attention to small high-pressure Engines for this description of boat, both single and double cylinder, and we have only to refer to the Illustrations on the following pages for the proof that the result of our labours has been to produce Engines which—for symmetrical and substantial design both in general arrangement and in detail—are unequalled by any other Maker. It has been our constant endeavour to produce machinery that will require the minimum amount of repairs, as it is the most mistaken policy possible to purchase an Engine which is constantly breaking down, perhaps at a most critical moment, and when the boat may be in a locality where the repairs may cost as much as the original price of the Engine.

A great many Manufacturers have entered this field of Engineering, and attempted to make Engines at prices far lower than ordinary Stationary Engines when fitted with reversing gear, so that it was impossible for them to put either good and sufficient materials or workmanship into them for the money. Another way of cutting down the price has been to specify Boilers which were so small and deficient in heating surface that it was impossible to get a sufficient quantity of Steam, and this has been especially felt in the case of Engines sent abroad, where inferior or deteriorated fuel has of necessity often to be used. The Boilers specified for our various Engines have ample capacity for the supply of Steam, as that is a condition of success which we have recognized from the first. We have laid down Special Machinery for the manufacture of these Engines, so that with our facilities we are confident that better value can nowhere be obtained; and we have had the satisfaction of supplying them to many eminent Engineers, who have preferred entrusting us with the work rather than make this class of Engine for themselves; and also to several Public Companies at home and abroad, and in every case they have given entire satisfaction.

In compiling the following Tables of Dimensions and Prices, we have especially had in view the convenience of our Foreign correspondents who build their own boats, and we believe they will there find all the necessary information to enable them to order the Engines they require without having to undergo the delay necessitated by their first requiring an estimate. The lengths from centre of Engine to aft extremity of Propeller Shaft, and also the lengths of Stern Tube, are given as those we should send out if not otherwise ordered. Boats having Twin Screws require considerably longer Stern Tubes than those having only single ones, and in their case we must have the approximate distance from centre of Engine to Propellers.

The Boilers specified in our Lists, except for a few of the smaller sizes, are Return Tube Boilers, as that type is the shortest possible on the line of keel, and keeps the centre of gravity low; but we can supply any type giving the same amount of heating surface for the same price, Locomotive or Vertical Tubular. We can also supply the Field, Davey Paxman, and other Patent Boilers by special arrangement. We also supply small Compound Screw-Engines, Surface Condensing Engines, Twin-Screw Engines, fitted on each side of fire box of Locomotive Boilers, Diagonal Engines, Paddle Engines, &c. Prices of which we will give on receipt of specification of requirements.

Quotations given for Iron and Wooden Boats, complete with Engines, &c.

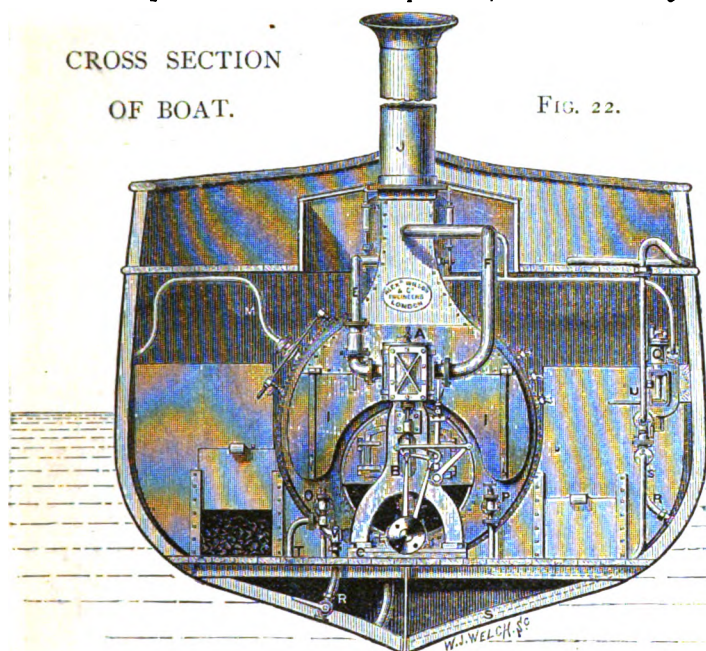
ALEX. WILSON AND CO.,
ENGINEERS, VAUXHALL IRON-WORKS, NINE ELMS, LONDON, S.W.

HIGH-PRESSURE SCREW ENGINES.

Fig. 22 represents the Transverse Section, and Fig. 23 the Longitudinal Section of the after-part of a Boat, with one of our 14-horse Double-Cylinder Screw Engines fitted to it. They are drawn to a Scale of $\frac{1}{4}$ inch to the foot, and give an exact representation of the whole machinery as actually fitted into a Boat. The Engine has a pair of Cylinders, 8 inches diameter, 9 inches stroke, as shown at Fig. 35. The Boiler is 5 feet 6 inches diameter, 7 feet long, with fifty Return Tubes $2\frac{1}{2}$ inches diameter. The Propeller is 4 feet diameter and 5 feet pitch.

CROSS SECTION
OF BOAT.

FIG. 22.

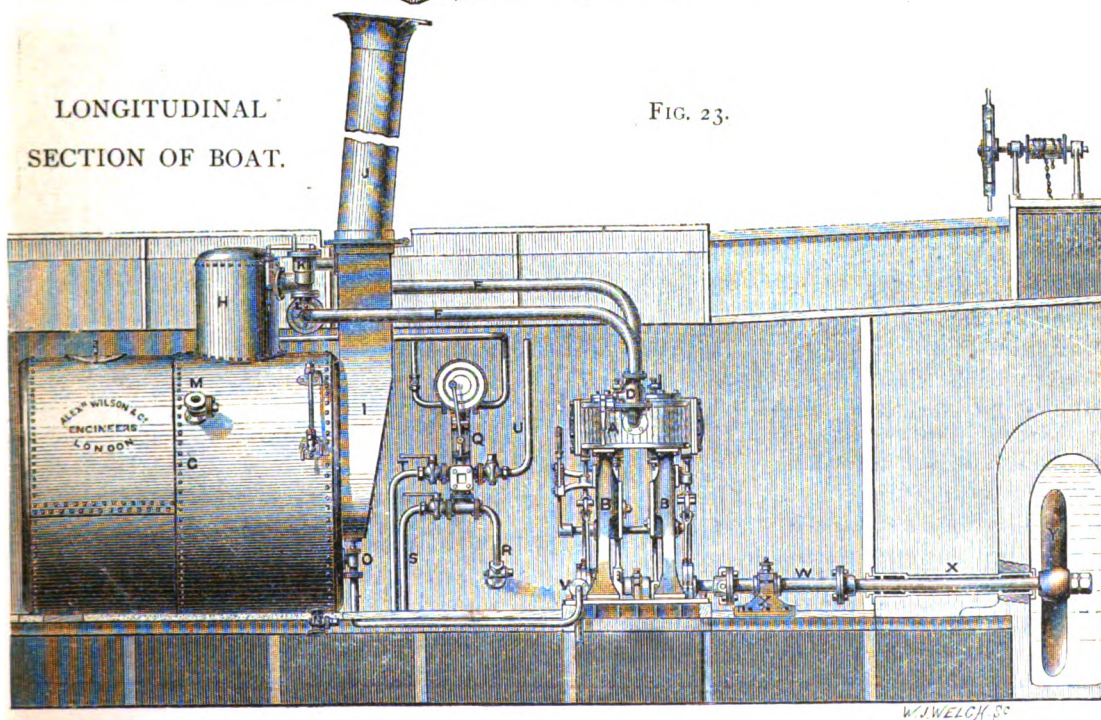


REFERENCES.

- A—Cylinders of Engine.
- B—Frames of Engine.
- C—Bed Plate of Engine.
- D—Steam Regulator.
- E—Steam Pipe.
- F—Exhaust Pipe.
- G—Boiler.
- H—Dome.
- I—Smoke Box.
- J—Funnel.
- K—Safety Valves.
- L—Stop Valve.
- M—Scum Cock and Pipe.
- N—Blow-off Cock and Pipe.
- O—Check Valve for Pump.
- P—Check Valve for Donkey.
- Q—Donkey Pump.
- R—Cock and Pipe from Sea.
- S—Cock and Pipe from Bilge.
- T—Cock and Pipe to Boiler.
- U—Cock and Pipe to Deck.
- V—Feed Pump on Engine.
- W—Intermediate Shaft.
- X—Propeller Shaft and Stern Tube.
- Y—Propeller.
- Z—Thrust Block.

LONGITUDINAL
SECTION OF BOAT.

FIG. 23.



ALEX. WILSON AND CO.,
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Table of Dimensions and Prices of Single-Cylinder Screw Engines.

Nominal Horse-power	2	2½	3	3½	5	7	9	12	15	20	28
Diameter of Cylinder	4½"	5"	5¾"	6"	7"	8"	9"	10"	12"	14"	16"
Stroke of Engine	4½"	5"	6"	6"	7"	8"	9"	11"	12"	14"	16"
Height over all	2' 6½"	2' 8½"	3' 4"	3' 6½"	3' 10½"	4' 5"	5' 1½"	5' 7½"	6' 1½"	6' 7"	7' 0"
From under side of Bed Plate to centre of Crank Shaft }	4½"	5"	5¾"	6½"	6½"	7½"	9"	10"	11"	1' 0"	1' 2"
Length of Bed Plate on Keel ..	1' 4"	1' 6½"	1' 7"	1' 9"	1' 10½"	2' 0"	2' 1½"	2' 3"	2' 5"	2' 9½"	3' 2"
Distance from centre of Engine to face of Coupling }	11"	8½"	11"	12"	1' 1½"	1' 2½"	1' 4"	1' 5"	1' 7"	1' 9"	1' 11½"
Breadth athwart	1' 4"	1' 5½"	1' 9"	1' 11"	2' 1½"	2' 5"	2' 8½"	3' 0"	3' 5½"	3' 11½"	4' 3½"
Diameter of Crank Shaft	1½"	1½"	2½"	2½"	2½"	2½"	3"	3½"	3½"	4"	4½"
„ Steam Pipe	1"	1½"	1½"	1½"	1½"	2"	2"	2½"	3"	3½"	4"
„ Exhaust ditto	1½"	1½"	1½"	1½"	2"	2½"	3"	3"	4"	4½"	5"
„ Pump Ram	1"	1½"	1½"	1½"	2"	2"	2½"	2½"	2½"	3"	3½"
„ Propeller	1' 11"	2' 2"	2' 3"	2' 6"	2' 9"	3' 0"	3' 3"	3' 6"	4' 0"	5' 0"	5' 6"
Pitch of ditto	3' 0"	3' 6"	3' 9"	3' 9"	4' 0"	4' 6"	5' 0"	5' 6"	6' 0"	6' 6"	8' 0"
Diameter of Propeller Shaft ..	1½"	1½"	2½"	2½"	2½"	2½"	2½"	3"	3½"	3½"	4"
„ ditto, if in Steel	1½"	1½"	2"	2"	2½"	2½"	2½"	2½"	3"	3½"	3½"
Length of ditto to aft side of Pro- peller }	6' 0"	6' 6"	5' 0"	6' 0"	6' 6"	7' 0"	7' 6"	8' 6"	9' 0"	10' 0"	11' 0"
Length of Intermediate Shaft ..	none.	none.	1' 6"	1' 6"	1' 8"	1' 10"	2' 2"	2' 6"	2' 6"	3' 0"	3' 3"
Length of Stern Tube between Flanges }	1' 8"	1' 10"	2' 2"	2' 6"	2' 10"	3' 2"	3' 5"	3' 6"	3' 6"	4' 3"	4' 6"
Diameter of Boiler	2' 9"	3' 0"	3' 6"	3' 9"	4' 0"	4' 6"	4' 6"	5' 0"	5' 6"	6' 3"	7' 0"
Length of ditto	4' 2"	4' 9"	5' 4"	4' 6"	5' 6"	6' 0"	6' 6"	7' 0"	7' 6"	8' 0"	9' 0"
Diameter of Flue }	2' 0"	2' 5"	2' 9"	1' 10½"	2' 0"	2' 3"	2' 3"	2' 6"	2' 9"	3' 0"	Two 2' 2"
„ Tubes	1½"	1½"	1½"	2"	2½"	2½"	2½"	2½"	2½"	2½"	2½"
Number of ditto	45	59	70	25	26	34	34	44	50	63	76
Diameter of Dome	1' 2"	1' 4"	1' 6"	1' 6"	1' 6"	1' 9"	1' 9"	1' 9"	1' 9"	2' 3"	2' 6"
Height of ditto	1' 0"	1' 6"	1' 9"	1' 8"	1' 9"	2' 0"	2' 0"	2' 0"	2' 3"	2' 3"	2' 6"
Total Heating Surface, sq. feet ..	29	46	62	68	82	115	138	186	228	343	431
Price of Engine	£40	£48	£58	£60	£75	£100	£125	£150	£180	£240	£320
Extra if with two Pumps	£4	£5	£5	£5	£7	£7	£8	£10	£10	£12	£15
Weight of Engine in cwts.	2½	3	6	5½	7½	10½	13	18	26	38	50
Price of Propeller, Shaft, Stern Tube, and Thrust Bearing .. }	£12	£14	£16	£16	£18	£22	£26	£32	£40	£56	£70
Approximate weight of ditto in cwts.	1	1½	2½	2½	3½	4½	5½	6½	8½	11½	14
Price of Boiler and Fittings	£70	£80	£88	£92	£106	£131	£143	£170	£195	£255	£350
Approximate weight of ditto in cwts.	12	17	21	24	27	43	49	65	77	90	120
Extra for requisite lengths of Steam and Water Pipes, with Flanges ready for brazing }	£4	£4	£5	£6	£7	£8	£9	£10	£12	£15	£20
Extra for Donkey Pump with its Fittings and Pipes }	£10	£10	£10	£10	£10	£13	£13	£17	£17	£19	£19

ALEX. WILSON AND CO.,
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Table of Dimensions and Prices of Double-Cylinder Screw Engines.

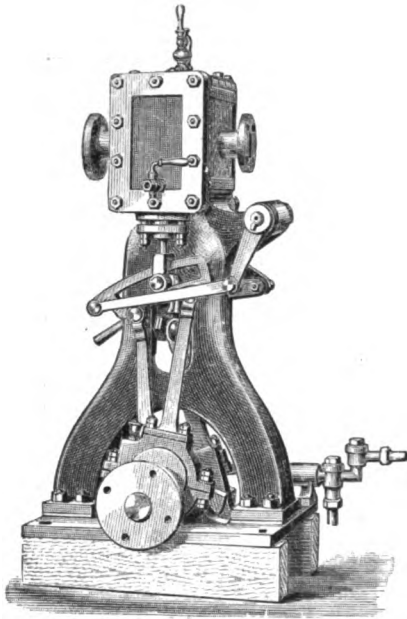
Nominal Horse-power	3½	5	7	8	10	14	18	24	30	40
Diameter of Cylinder	4"	5"	6"	6½"	7"	8"	9"	10"	12"	14"
Stroke of Engine	5"	6"	7"	7½"	8"	9"	10"	12"	14"	18"
Height over all	2' 8¼"	3' 2¼"	3' 8½"	3' 8½"	4' 3¼"	4' 9¼"	5' 2¼"	6' 9"	7' 3"	8' 6"
From under side of Bed Plate to centre of Crank Shaft	4½"	5½"	6½"	6½"	7½"	8½"	9½"	10½"	1' 0"	1' 2"
Length of Bed Plate on Keel	2' 0¼"	2' 3"	2' 7½"	2' 8½"	2' 9½"	3' 1½"	3' 6"	3' 10"	4' 2½"	4' 8"
Distance from centre of Engine to face of Coupling	1' 3½"	1' 4½"	1' 7"	1' 7½"	1' 8"	1' 9½"	1' 2½"	1' 10"	2' 6"	3' 2"
Breadth athwart	1' 6½"	1' 9½"	2' 0"	2' 1½"	2' 3½"	2' 6½"	2' 10"	3' 5½"	4' 2"	4' 8"
Diameter of Crank Shaft	1½"	2"	2½"	2½"	3"	3½"	3½"	4"	4½"	5"
Diameter of Steam Pipe	1½"	1½"	1½"	1½"	2"	2½"	3"	3½"	4"	5"
„ Exhaust ditto	1½"	2"	2"	2"	2½"	3"	4"	5"	6"	7"
„ Pump Ram	1½"	2"	2"	2½"	2½"	2½"	2½"	3"	3½"	4"
„ Propeller	2' 2"	2' 6"	2' 9"	3' 0"	3' 3"	4' 0"	4' 6"	5' 0"	5' 6"	6' 0"
Pitch of ditto	3' 6"	3' 6"	4' 0"	4' 0"	4' 6"	5' 0"	5' 6"	6' 6"	8' 0"	9' 0"
Diameter of Propeller Shaft	1½"	2½"	2½"	2½"	3"	3½"	3½"	3½"	4"	4½"
„ ditto, if in Steel	1½"	2"	2½"	2½"	2½"	2½"	3"	3½"	3½"	3½"
Length of ditto to aft side of Pro- peller	6' 6"	6' 0"	7' 0"	7' 6"	8' 0"	8' 6"	9' 3"	10' 0"	11' 0"	12' 6"
Length of Intermediate Shaft	none	1' 6"	1' 8"	1' 10"	2' 2"	2' 6"	2' 9"	3' 0"	3' 3"	3' 6"
Length of Stern Tube between Flanges	2' 2"	2' 6"	3' 0"	3' 2"	3' 5"	3' 6"	3' 9"	4' 3"	4' 6"	5' 0"
Diameter of Boiler	3' 9"	4' 0"	4' 6"	4' 6"	5' 0"	5' 6"	6' 0"	6' 6"	7' 3"	8' 0"
Length of ditto	4' 6"	5' 6"	6' 0"	6' 6"	7' 0"	7' 6"	7' 6"	8' 0"	9' 6"	9' 6"
Diameter of Flue	1' 10½"	2' 0"	2' 3"	2' 3"	2' 6"	2' 9"	2' 10½"	3' 2"	Two 2' 3"	Two 2' 4"
„ Tubes	2"	2½"	2½"	2½"	2½"	2½"	2½"	2½"	2½"	2½"
Number of ditto	25	26	34	34	44	50	58	81	86	102
Diameter of Dome	1' 6"	1' 6"	1' 9"	1' 9"	1' 9"	1' 9"	2' 0"	2' 3"	2' 6"	2' 6"
Height of ditto	1' 8"	1' 9"	2' 0"	2' 0"	2' 0"	2' 3"	2' 3"	2' 3"	2' 6"	2' 6"
Total Heating Surface, sq. feet	68	82	115	138	186	240	302	356	541	614
Price of Engine	£70	£90	£110	£125	£145	£190	£240	£280	£340	£420
Extra if with Two Pumps	£5	£7	£7	£8	£8	£10	£10	£12	£15	£20
Weight of Engine in cwts.	4	7½	11½	13	16	21	29	38	63	95
Price of Propeller, Shaft, Stern Tube, and Thrust Bearing	£16	£18	£22	£25	£28	£39	£48	£60	£72	£90
Approximate weight of ditto in cwts.	1½	2½	3½	4½	5½	7½	10½	12½	14½	19
Price of Boiler and Fittings	£92	£106	£131	£143	£170	£195	£230	£285	£410	£470
Approximate weight of ditto in cwts.	24	27	43	49	65	77	82	96	130	150
Extra for requisite lengths of Steam and Water Pipes, with Flanges ready for brazing	£6	£7	£8	£9	£9	£10	£12	£15	£20	£30
Extra for Donkey Pump with its Fittings and Pipes	£10	£10	£13	£13	£13	£17	£17	£19	£19	£22

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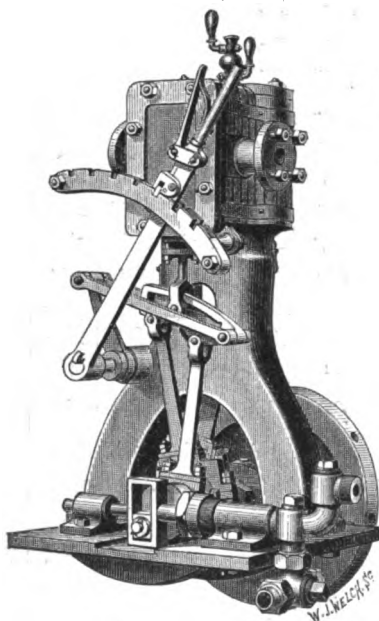
SINGLE-CYLINDER SCREW ENGINES.

FIG. 25.



SINGLE-CYLINDER SCREW ENGINE.
4½ inches diam., 4½ inches stroke.

FIG. 27.

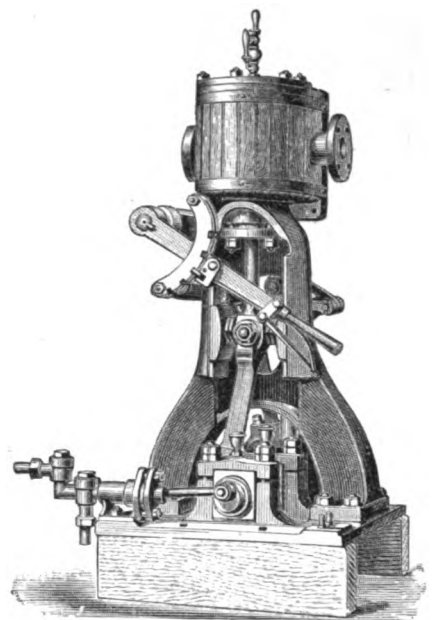


SINGLE-CYLINDER SCREW ENGINE.
5 inches diam., 5 inches stroke.

Figs. 25 and 26 represent our Single-Cylinder Screw Engine, with Cylinder 4½ in. diameter, 4½ inches stroke. Figs. 27 and 28 represent our Single-Cylinder Screw Engine, 5 inches diameter, 5 inches stroke. All these four woodcuts are taken from photographs of the Engines as they are actually made, and give an accurate idea of the proportions we adopt. The Cylinder is cast in one piece with the Standard, which is of a substantial form, being cast hollow in the lower part, and the Guide Bars formed on the Standard, which being accurately planed in line with the Cylinder cannot be altered out of truth. The Guides are adjustable by screws on the cross-bend to take up wear. Feed Pumps are of Gun Metal. Crank Shaft, of the 4½-inch size, is of Bessemer Steel.

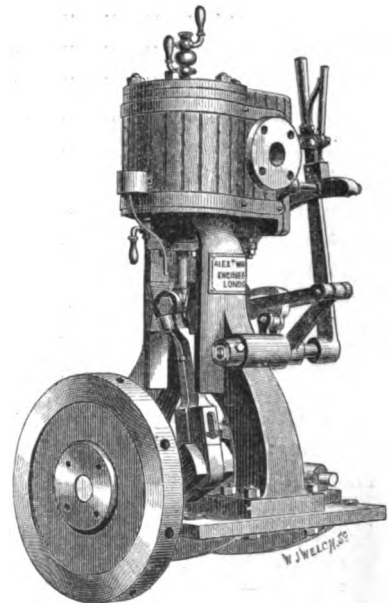
For Prices of these Engines, see our Tabular Price List on page 36.

FIG. 26.



SINGLE-CYLINDER SCREW ENGINE.
4½ inches diam., 4½ inches stroke.

FIG. 28.



SINGLE-CYLINDER SCREW ENGINE.
5 inches diam., 5 inches stroke.

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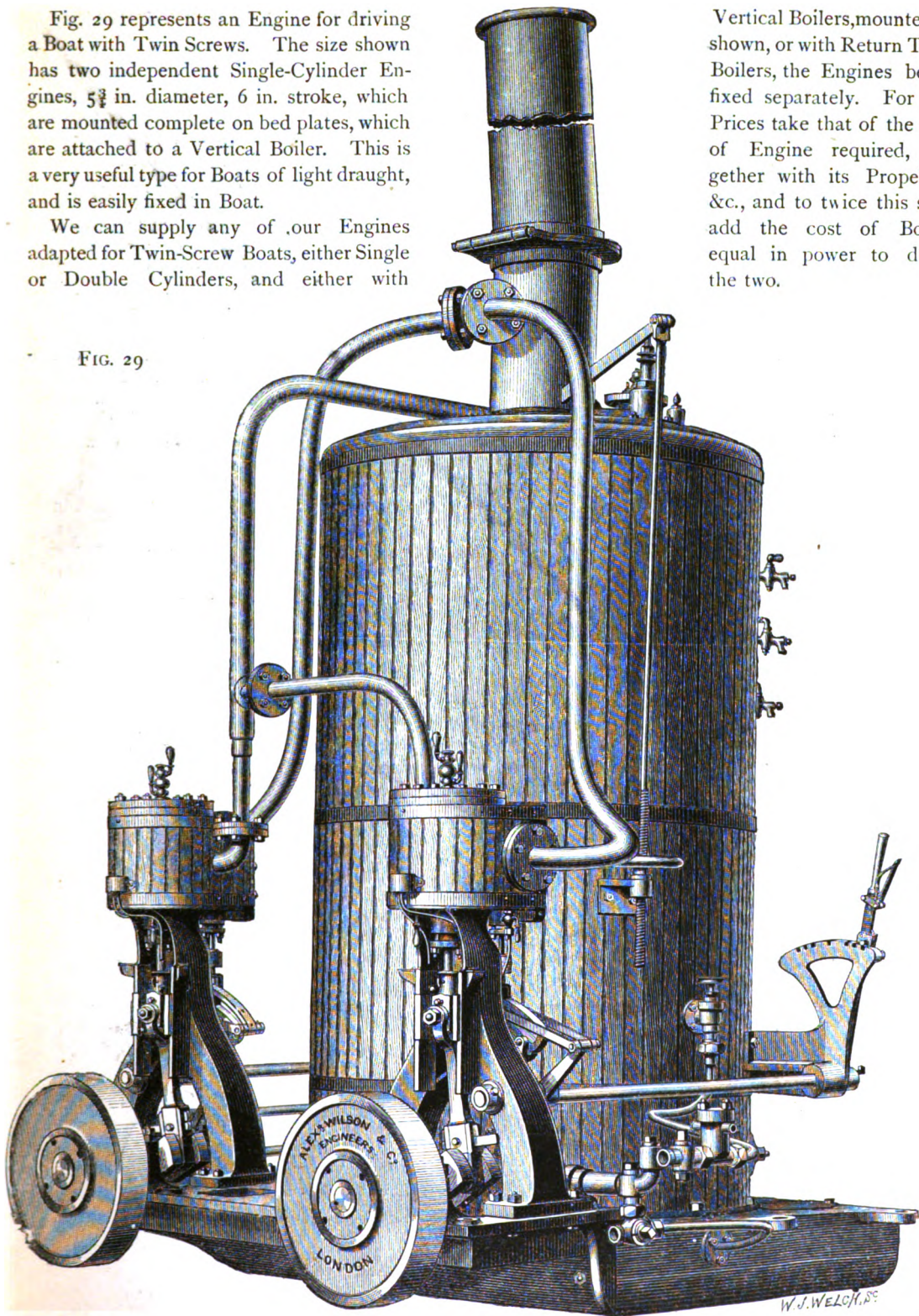
TWIN-SCREW STEAM ENGINE.

Fig. 29 represents an Engine for driving a Boat with Twin Screws. The size shown has two independent Single-Cylinder Engines, 5½ in. diameter, 6 in. stroke, which are mounted complete on bed plates, which are attached to a Vertical Boiler. This is a very useful type for Boats of light draught, and is easily fixed in Boat.

We can supply any of our Engines adapted for Twin-Screw Boats, either Single or Double Cylinders, and either with

Vertical Boilers, mounted as shown, or with Return Tube Boilers, the Engines being fixed separately. For the Prices take that of the size of Engine required, together with its Propeller, &c., and to twice this sum add the cost of Boiler equal in power to drive the two.

FIG. 29



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SINGLE-CYLINDER SCREW ENGINE.

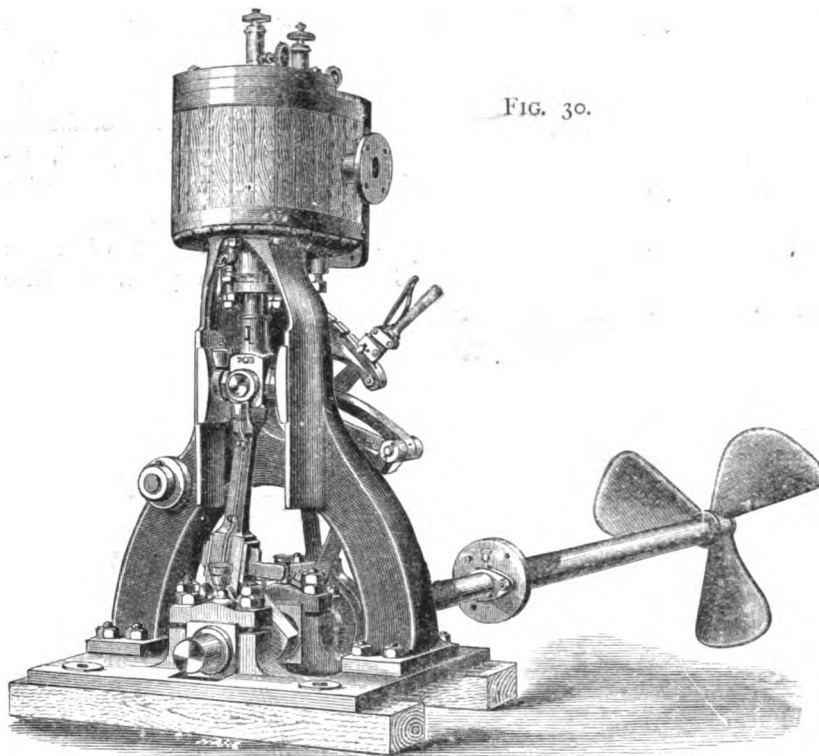


FIG. 30.

Figs. 30 and 31 represent our Single-Cylinder Screw Engine, having Cylinder 7 inches diameter, 7 inches stroke, with Propeller, Steam Tube, Propeller Shaft, and Thrust Bearing, taken from two different points of view and on two different scales. The woodcuts are taken from photographs, and give an accurate idea of the proportions which we adopt. The Stern Tube being for a Twin-Screw Boat, is shown of greater length accordingly.

The Cylinder, up to and including the 8-inch size of our single Engines, is cast in one piece with the Standard, which is of a most substantial form, being cast hollow in the lower part, and the Guide Bars are

formed on the Standard, which being accurately planed in line with the Cylinder, cannot be altered out of truth. This Engine is shown without Gun-Metal Feed Pump, but they can be supplied with or without one, or with both Feed and Bilge Pumps, as per Price List. Where it is possible, we always make the Propeller Shafts of our larger Engines above 5 horse-power in two pieces, the Thrust Bearing being formed in the part next the Engine, by the removal of which the other length can be drawn inward sufficiently to get the Propeller off. For Prices of these Engines, see our Tabular Price List, page 36.

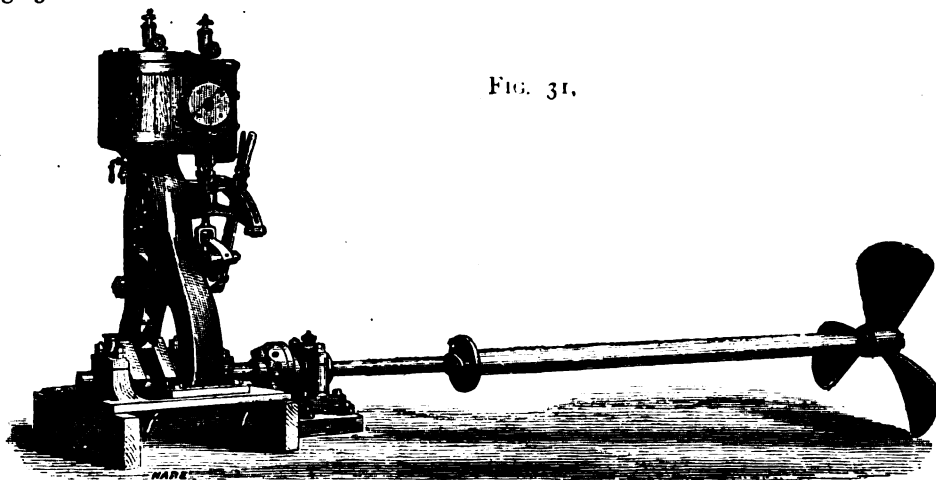


FIG. 31.

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SINGLE-CYLINDER SCREW ENGINES.

Figs. 32 and 33 represent our Single-Cylinder Screw Engine, with cylinder 10 inches diameter, 11 inches stroke. The woodcuts have been copied from photographs of the Engines as made, and give an accurate idea of the proportions we adopt. The Engine is shown fitted with one Pump, but it can be

supplied with or without one, or with both Feed and Bilge Pumps. The cylinder is cast separate from the standard in all sizes of Single-Cylinder Engines above the 8-inch size. All the standards are now made of the box form cored out inside. (See Figs. 30, 31.) Single-Cylinder Engines fitted with Reversing Gear are not liable to stick on the centre. They are slightly cheaper, occupy less room on the line of the keel, but are a little higher than Double-Cylinder Engines of the same power.

For Prices of these Engines, see our Tabular Price List, page 36.

FIG. 32.

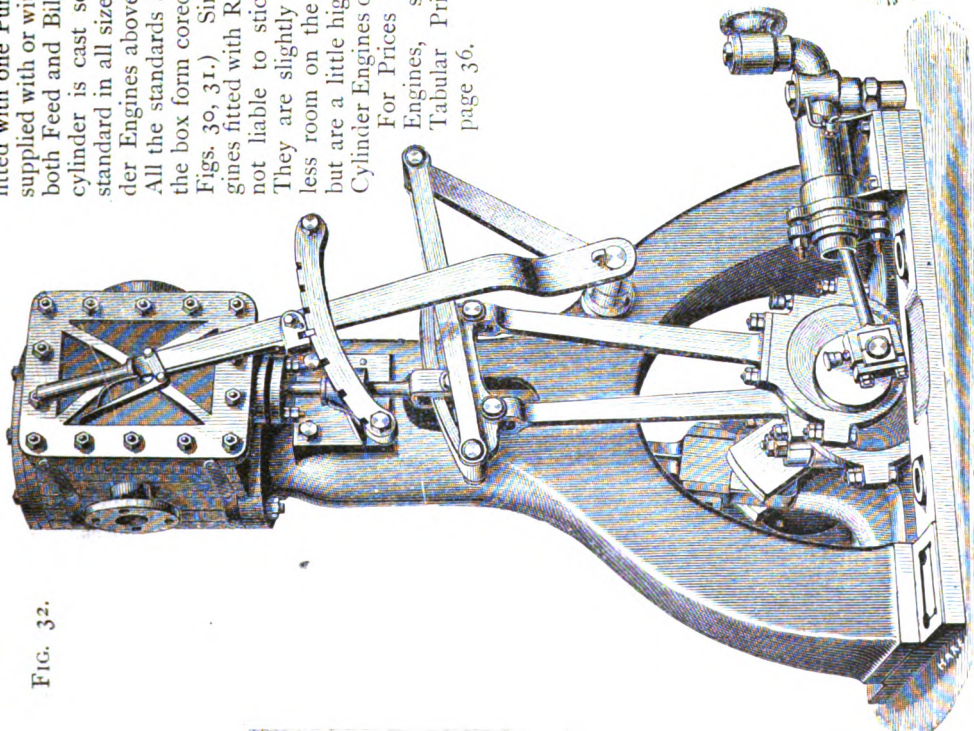
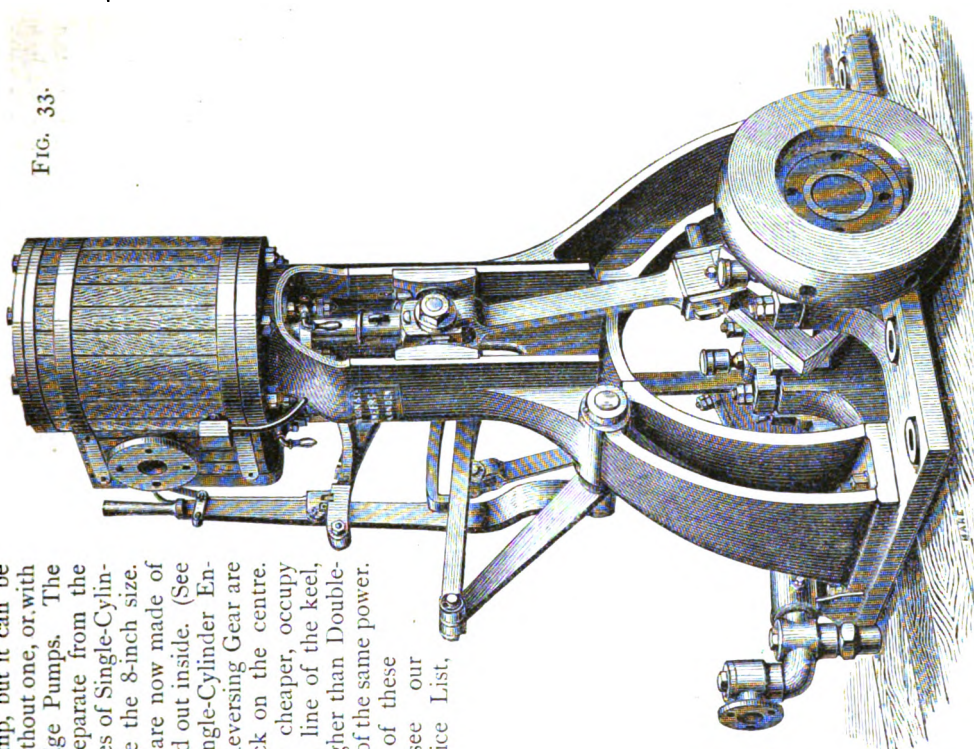


FIG. 33.



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DOUBLE-CYLINDER SCREW ENGINES.

FIG. 34.

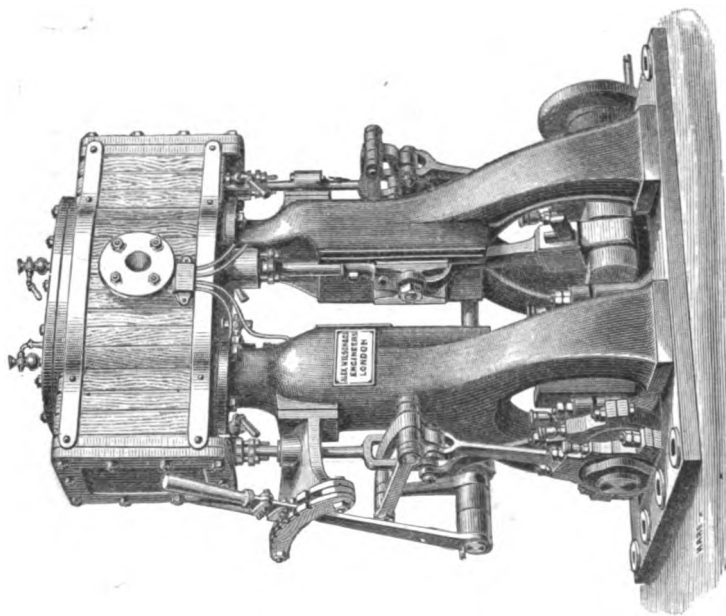


FIG. 35.

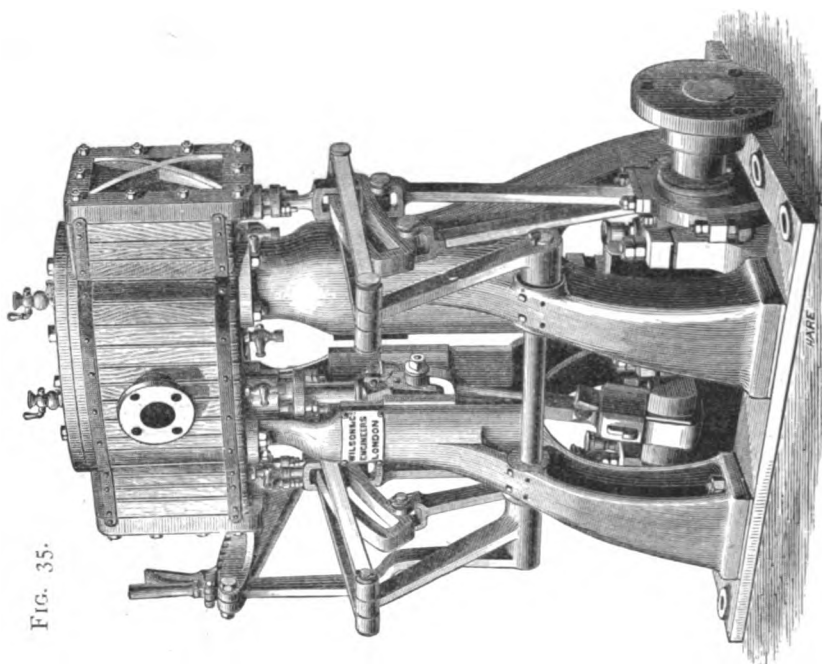


Fig. 34 represents our Double-Cylinder Screw Engine, with Cylinders 8 inches diameter, and 9 inches stroke. The woodcuts have been copied from photographs of the actual Engines, and give an accurate idea of the proportions we adopt. The 8-inch size has now been altered in so far as it is fitted with guides to the valve spindles, same as the 6-inch size. This improvement—which prevents the gland from being worn oval—is applied to all our Engines except the two smallest sizes.

Double-Cylinder Engines cost only about 5 to 10 per cent. more than Single-Cylinder Engines of the same power when the Boiler is taken into account, as that must be the same for both. They have the advantage of being less in height, but they occupy more room on the line of the keel than Single-Cylinder Engines. For Prices of these Engines, see our Tabular Price List, page 37.

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DOUBLE-CYLINDER SCREW ENGINES.

FIG. 36.

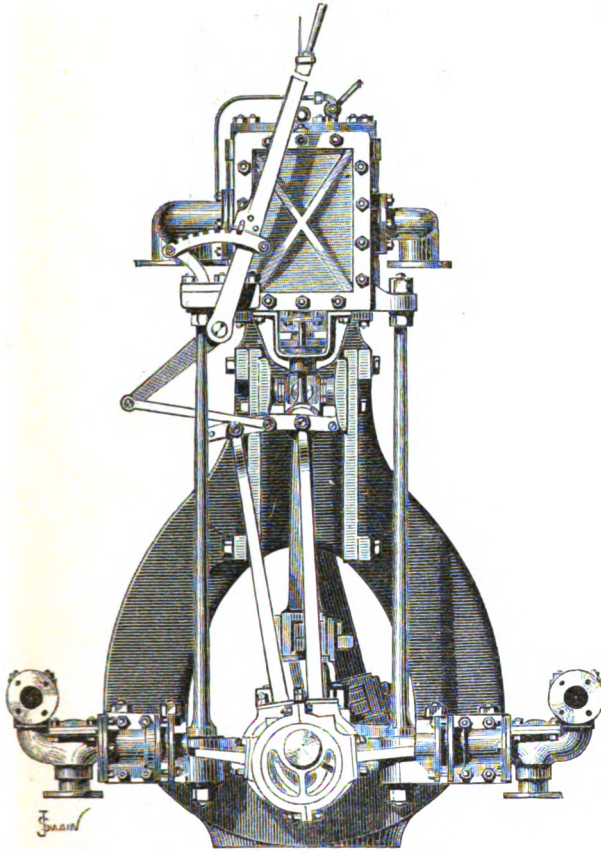


FIG. 37.

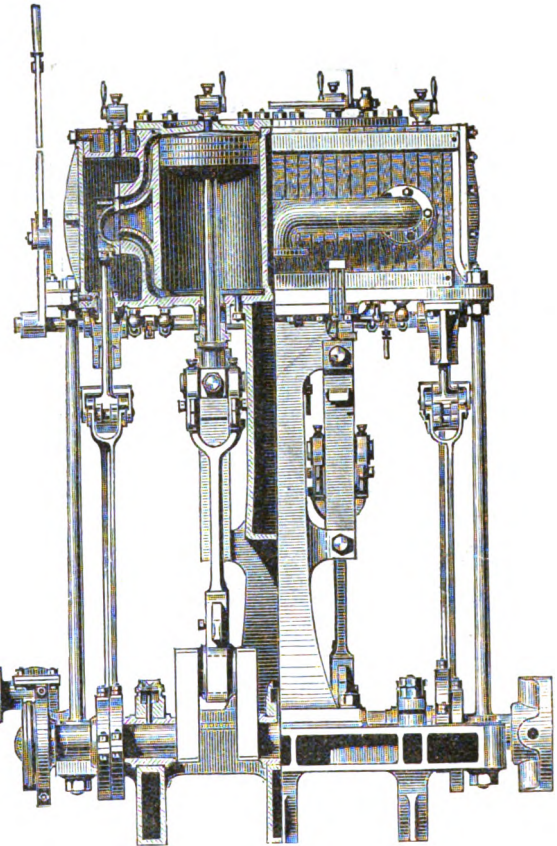


Fig. 36 is the end elevation, and Fig. 37 the side elevation, partly shown in section, of our Double-Cylinder Screw Engines, 14 inches diameter, and 18 inches stroke. We make all our Double-Cylinder Engines above 8 inches diameter on this design, which is of the most substantial description—as will be seen from the woodcuts: the general arrangement is somewhat similar to our usual pattern, except in regard to the framing. This consists of a central standard of massive design, and cast hollow to give great stiffness, to which the guide bars are attached on each side by means of projecting lugs. The base of this standard where it rests on the bed plate extends beyond the centre line of the cylinders, and in addition, the outer corners of the cylinders are supported by four turned wrought-iron stanchions or pillars, thus securing a framework of great rigidity combined with lightness, while every part of both Engines is perfectly accessible for the purpose of necessary adjustment. As shown in the woodcut, the reversing lever has been carried upwards so as to be worked from the deck, but it is always arranged to be worked from level of bed plate unless otherwise ordered. The other details are very similar in design to those already described, our chief care being to have all parts made so as to endure hard work. For Prices of these Engines, see our Tabular Price List, pages 36 and 37.

When required, the smaller sizes can be made to the above design at an extra cost of £5.

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G 2

FIG. 38.

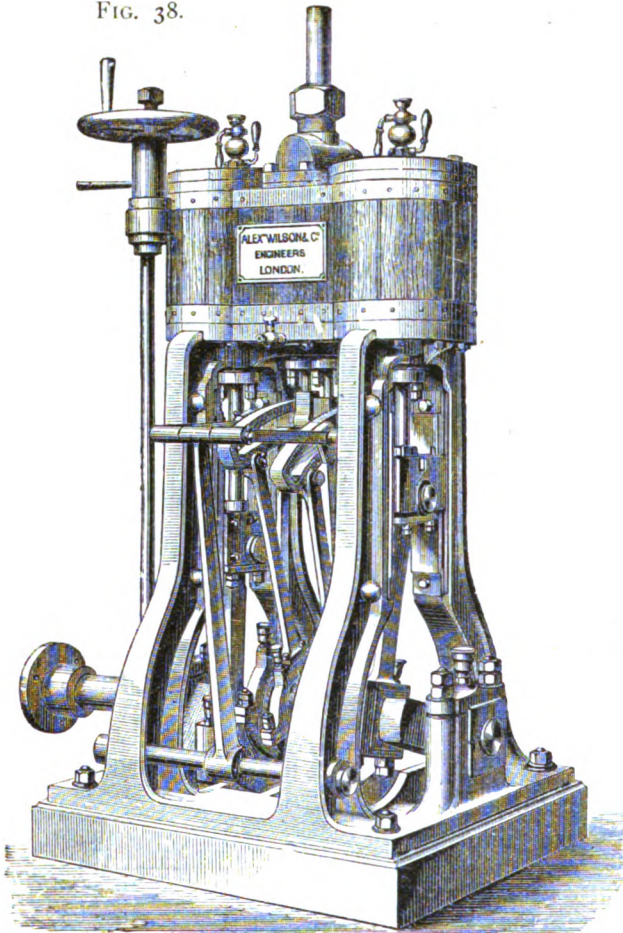


FIG. 39.

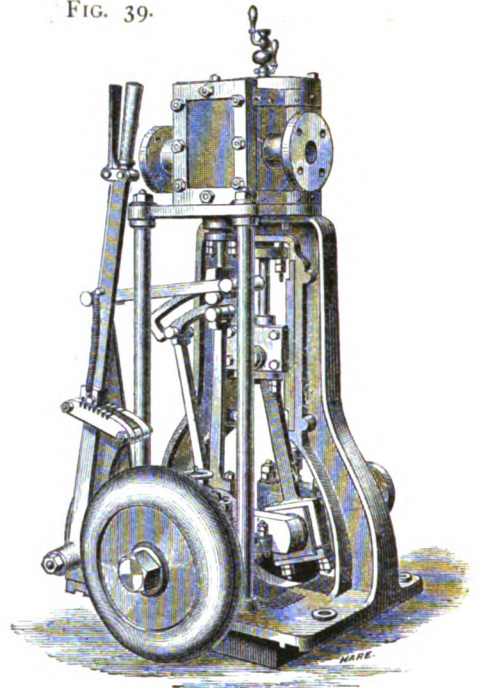
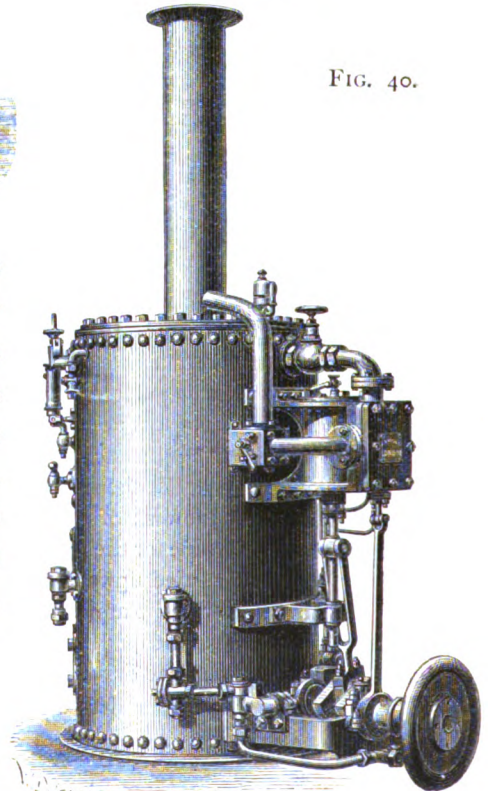


FIG. 40.



Figs. 38, 39, and 40 represent types of Screw Engines differing from our standard patterns, and they are only supplied to special order and quotation. Fig. 38 is a pair of 5-inch double Engines, 6 inches stroke, with valves inside, which though compact and all gear out of the way, has the disadvantage of not being readily accessible. Fig. 39 is a 5-inch single Engine, 6 inches stroke; and Fig. 40 is a 5-inch single Engine, 6 inches stroke, attached to Boiler, which has the advantage of keeping down the weight of the machinery.

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OVERHEAD STEAM TRAVELLER.

FIG. 41.

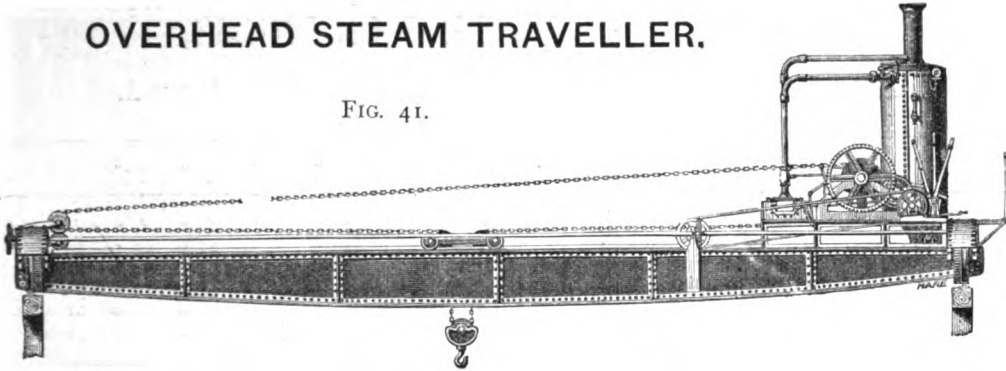


Fig. 41 represents an Overhead Steam Traveller, from which pattern the Cranes were made for removing the old and rebuilding the new Blackfriars Bridge, London. Five Cranes were used in this important work; and similar Cranes were also used at Victoria Railway Bridge, Pimlico; East Bute Dock, Cardiff; Limehouse Dock; and two can now be seen at work daily at the Stone Dépôt of the London and South-Western Railway, Nine Elms, close to the Vauxhall Iron-works. The advantage of this Steam Traveller over all others is that the Boiler, Engine, and Gearing are all fixed at one end, so that the Girders have only to carry the weights that are lifted, while the strain on the Gantry caused by the whole Engine travelling with the suspended load is entirely obviated.

Price of a Crane, with wrought-iron Girders, 40 feet Span and to lift 10 tons £500

Price of ditto, with trussed wooden Beams, 40 feet Span and to lift 10 tons £420

Prices of different Spans and Capacities on application.

HAND TRAVELLER.

FIG. 42.

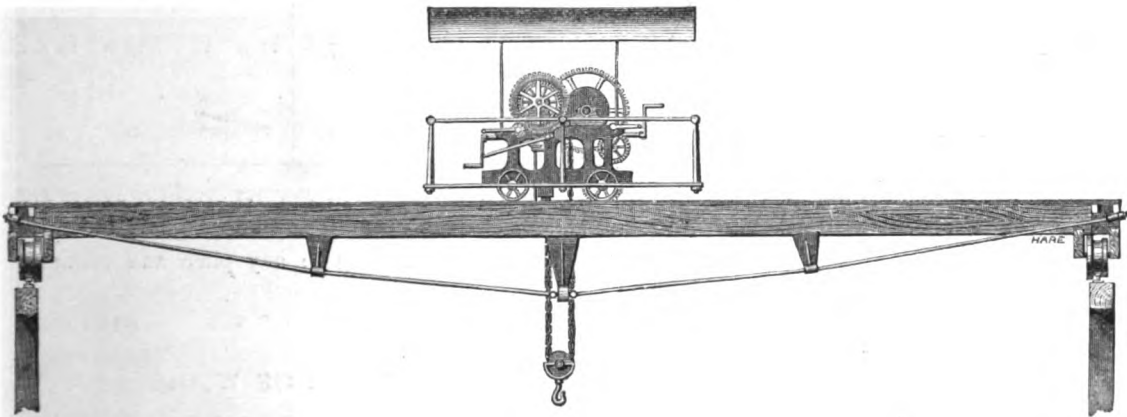


Fig. 42 represents a Hand Travelling-Crane which is too well known to need description.

Price of a Hand Crane, with trussed wood Beams, 40 feet Span and to lift 10 tons, £220.

Prices of different Spans and Capacities on application.

We also manufacture every description of Crane, Hoist, and Lift, worked by Steam, Hydraulic, or Hand Power.

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PRICE LIST OF PULLEYS OR DRUMS,

All Turned on the face and edges and Bored.

Diam.	10"	12"	14"	15"	16"	18"	20"	21"	22"	24"	27"	30"	33"	36"	40"
Width on Face.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
4	8 0	10 0	11 6	12 3	13 0	14 9	15 6	17 3	18 0	19 6	23 0	25 6	28 0	30 6	33 0
6	11 0	13 3	15 6	16 6	18 0	19 0	20 9	22 9	24 0	26 0	30 6	34 0	37 6	41 0	44 0
8	13 9	16 6	19 6	20 6	23 0	24 6	26 0	28 3	30 0	32 6	38 3	42 6	47 0	51 0	55 0
10	16 6	19 9	23 6	24 9	28 0	29 6	31 3	33 9	36 0	39 0	46 0	51 0	56 0	61 0	66 0
12	19 3	23 0	27 6	28 9	33 0	34 9	36 6	39 3	42 0	45 6	54 0	60 0	66 0	72 0	77 0

Intermediate diameters and widths at proportionate rates, and larger sizes can be supplied. Split Pulleys are charged 20 per cent. extra. Cutting Keyways, 2s. 6d. to 4s. 6d. extra. Patent Wrought-iron Drums also supplied.

PRICE LIST OF BRIGHT SHAFTING, PLUMMER BLOCKS, &c.

Diameters in Inches.	1½"	1½"	1¾"	2"	2¼"	2½"	2¾"	3"	3½"	3½"	4"	4½"
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Shafting, per foot	2 6	2 8	3 0	3 6	4 6	5 6	6 0	7 0	10 0	11 6	14 0	17 6
Plummer Blocks, fitted with Lieuvain's Lubricators, each Extra, if fitted with Top Brasses	10 0	12 6	14 0	15 6	18 0	22 0	25 0	30 0	36 0	45 0	56 0	72 6
Plummer Blocks, fitted with White Metal Bearings Top and Bottom, each	1 6	2 0	2 3	2 6	3 0	4 0	5 0	6 0	7 6	10 0	12 0	14 0
Turned Couplings, fitted with Bolts, and Keyways cut, each	7 6	9 0	10 6	12 0	14 0	16 0	18 6	24 0	30 0	40 0	50 0	60 0
Turned Collars, fitted with Set Screws	2 6	2 8	3 0	3 6	4 6	5 6	6 0	7 6	11 0	12 0	15 0	19 6
Weight of Shafting per foot, in lbs.	4½	6	8	10½	13½	16½	20½	24	28	32½	42½	54

Odd lengths of Shafting are charged 10 per cent. extra. If made of Bessemer Steel the Prices are 50 per cent. extra. We also supply Wall Boxes and Brackets of various designs to support Plummer Blocks; also Hangers fitted with Brasses. Spur Wheels and Pinions to any pitch and diameter moulded by Machine.

PRICES OF SAW SPINDLES FOR BENCHES MADE OF WOOD.

Diameter of Spindle	1½"	1½"	1¾"	2"	2¼"	2½"	2¾"	3"
Length from Outer End to Saw ..	3' 3"	3' 6"	3' 9"	3' 11"	4' 3"	4' 8"	5' 0"	5' 6"
Diameter of Fast and Loose Pulleys ..	6"	8"	8"	9"	10"	1' 0"	1' 2"	1' 4"
Width of ditto	4"	5"	6"	6"	6"	7"	8"	9"
Suitable for Diameter of Saw of ..	1' 6"	2' 0"	2' 6"	3' 0"	3' 6"	4' 0"	5' 0"	6' 0"
Price	£3 5s.	£4 4s.	£5 2s.	£6	£7 4s.	£8 15s.	£10 4s.	£12

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MICHELE'S PATENT CEMENT-TESTING MACHINE.

ITS ADVANTAGES ARE :—

1. **CHEAPNESS.** 2. **ACCURACY.** 3. **PORTABILITY.**

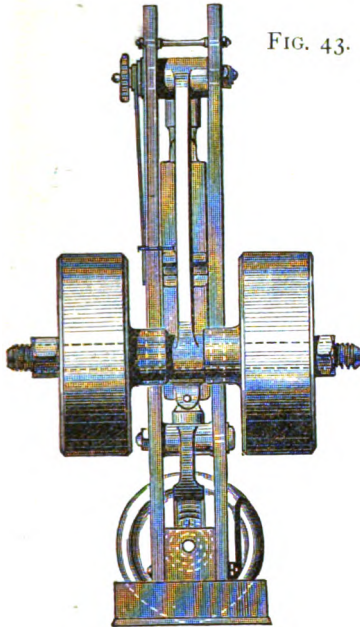


FIG. 43.

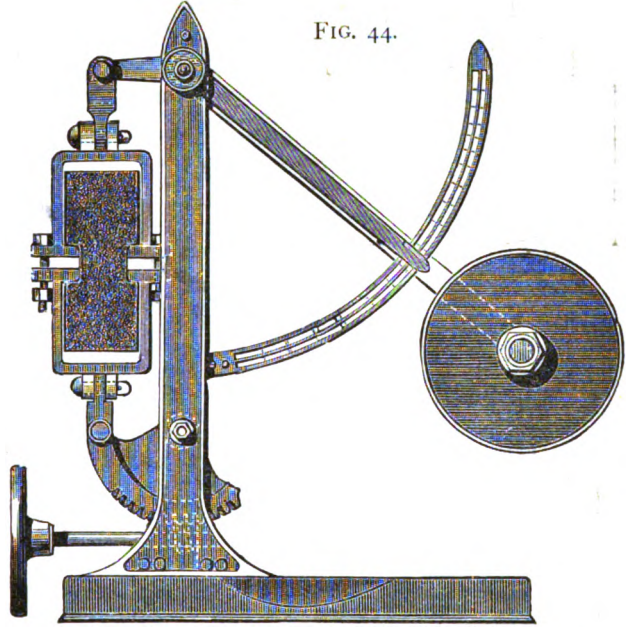


FIG. 44.

The block to be tested is placed in the jaws prepared to receive it; the handle is then turned, which raises the weighted lever by exerting a pull on its short end through the medium of the cement block. When the leverage is so increased as to exert a force too great for the cement to sustain, it breaks, and the lever falls, leaving the index-pointer at the spot to which it had been raised. The arc along which the pointer moves is graduated to show the number of pounds of tensile strain applied. A suitable arrangement, when the cement block breaks, prevents the lever from falling more than half an inch.

As the force is thus gradually applied to the block of cement, it is impossible that its breaking point can be influenced by any jerk or uneven strain.

MICHELE'S CEMENT-TESTING MACHINES

Are now generally specified to be employed on all large Works where Cement is extensively used, and no Resident Engineer should be without one.

They are now used on all Public Works carried out by

HER MAJESTY'S WAR DEPARTMENT.

THE ADMIRALTY.

H.M.'S PUBLIC WORKS DEPARTMENT, INDIA.

THE CROWN AGENTS OF THE COLONIES.

Also by many Dock Boards, Harbour Commissioners, Railway Companies, and the leading Civil Engineers, Contractors, and Cement Manufacturers.

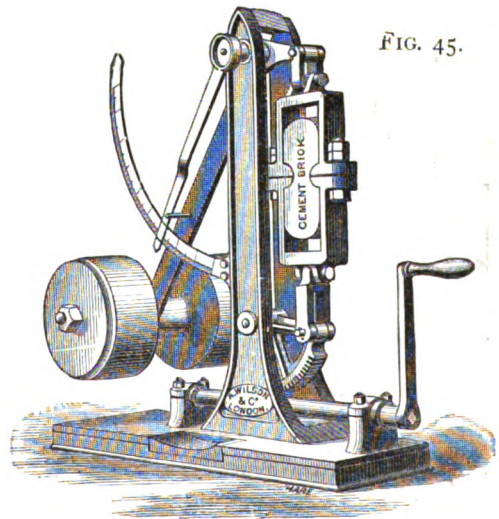


FIG. 45.

Price of a Machine to exert a tensile strain not exceeding 1000 lb.	.. .. .	£24
" " " " " " 1200 lb.	.. .. .	£26
" " " " " " 1500 lb.	.. .. .	£28
Price of Gun-Metal Moulds, accurately made for Section, 1 in. by 1 in.		£1 5s. each
" " " " " " 1½ in. by 1½ in.		£1 10s.

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ENGINEERS, VAUXHALL IRON-WORKS, NINE ELMS, LONDON, S.W.

FIG. 46.

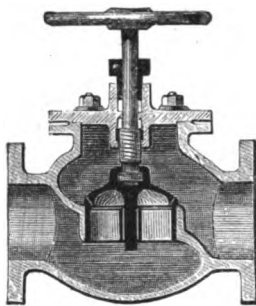


FIG. 48.

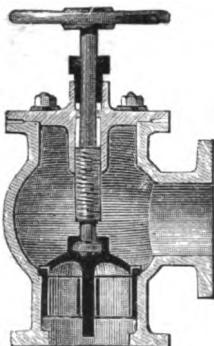
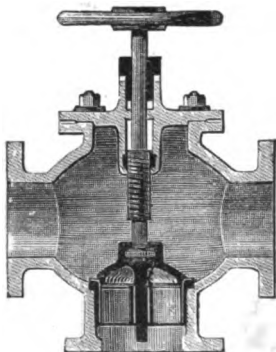


FIG. 50.



We beg to call attention to our improved manufacture of "*Steam Stop-Valves*," which, in Materials, Workmanship, and Finish, are very superior to any in the Market, while the prices are not at all increased. Engineers have hitherto experienced a great difficulty in obtaining a good and reliable Valve, many being made with the Nut cast on the Spindle, to save screw cutting, whilst some even have the threads cast in white metal. Others again are made with wrought-iron Spindles, which are continually sticking fast in the Nut, or the Spindle becoming eaten away with rust is never tight in the Stuffing Box. The Flanges and Wheels are also generally quite rough, and those who wish a superior article, have either to remake them, or manufacture them from their own patterns, which is of course expensive.

The Valves here offered have their Seatings, Valves, Nuts, Glands, and Spindles up to the 7-inch size, made of the best gun metal. The 7-inch size and upwards have the Spindles of wrought iron, the Nut and Screw being placed outside, as shown in Figs. 47, 49, and 51. The Nuts are properly cut in the Lathe, the Wheels are turned bright, and the Flanges all faced and turned on the edge, and the Valves can therefore be used in any Engine Room, whilst they recommend themselves in every situation where a superior article is required.

By adopting the system of keeping our leading articles of manufacture always in stock and in progress, we are generally able to execute orders for these Valves on receipt.

If Valves are required with Flanges larger in diameter than those given in the List, they are charged extra.

FIG. 47.

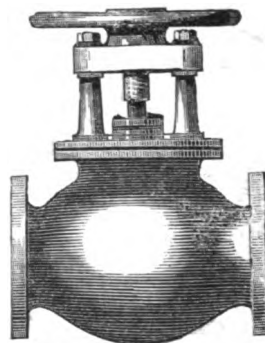


FIG. 49.

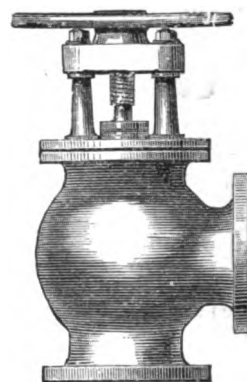
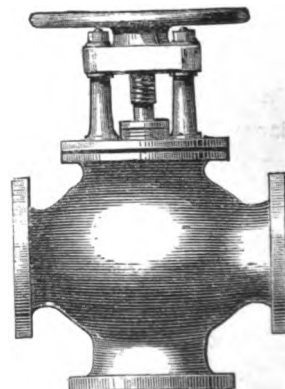


FIG. 51.



REDUCED PRICE LIST.

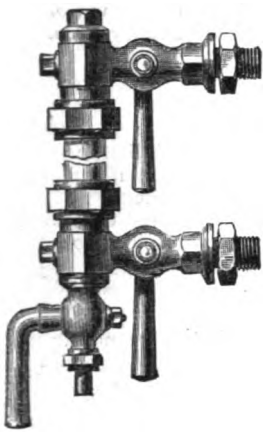
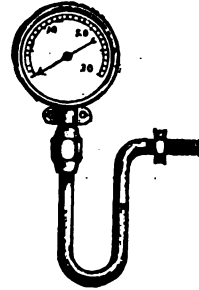
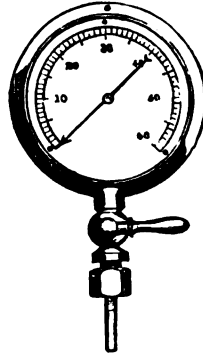
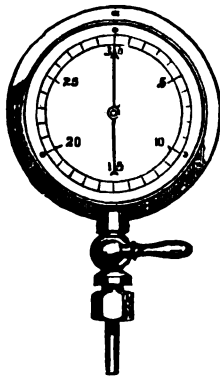
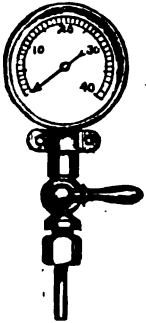
Bore.	Dia. of Flange.	Length over Flange, Single way.	Length over Flange, Double way.	Price of Single-way and Elbow Valves.	Price of Double-way Valves.
inch.	inch.	inch.	inch.	£ s. d.	£ s. d.
2	6½	9	10	1 10 0	2 0 0
2½	7	9½	10½	1 17 6	2 10 0
3	7½	10	11	2 7 6	3 5 0
3½	8	12	13	3 0 0	4 0 0
4	9	14	15	3 15 0	4 15 0
5	10	16	18	4 10 0	6 0 0
6	12	18	20	5 10 0	8 0 0
7	13½	18	20	6 15 0	9 5 0
8	14	20	22	8 10 0	9 10 0
9	15½	22	24	10 0 0	12 10 0
10	17	23	26	12 10 0	15 0 0
12	19	26	30	16 10 0	18 10 0

Valves with unturned Wheels and Flanges, a facing strip forming the joint, are 15 per cent. less than the above.

ALEX WILSON AND CO.,

ENGINEERS, VAUXHALL IRON WORKS, NINE ELMS, LONDON, S.W.

PRESSURE GAUGES.



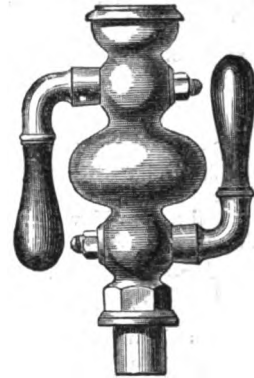
Diam. of Dial	3"	4"	5"	6"	7"
Price	16 0	16 6	19 0	22 6	25 0
Extra for Cock	3 0	3 0	3 6	4 0	4 6

GLASS GAUGES.

Diam.	Price.	With Flanges.
inches.	s. d.	s. d.
$\frac{1}{8}$	22 0	28 6
$\frac{1}{4}$	23 0	29 6
$\frac{3}{8}$	27 6	34 6
$\frac{1}{2}$	37 6	45 0
$\frac{3}{4}$	40 0	48 0
1	50 0	58 0

DOUBLE GREASE CUPS.

Diam.	Price.	With Flanges.
inches.	s. d.	s. d.
$1\frac{1}{4}$	5 0	6 3
$1\frac{1}{2}$	5 9	7 0
$1\frac{3}{4}$	6 6	8 0
2	7 0	8 6
$2\frac{1}{2}$	12 0	14 0
3	15 9	18 6



GAUGE COCKS.

	3 3	4 2
$\frac{1}{8}$	4 0	5 0
$\frac{1}{4}$	4 9	5 6
$\frac{3}{8}$	5 6	6 10
$\frac{1}{2}$	7 0	8 6
$\frac{3}{4}$	9 0	10 9
1	11 0	13 0

OIL CUPS.

	1 0	..
$\frac{1}{8}$	1 2	..
$\frac{1}{4}$	1 6	2 9
$\frac{3}{8}$	2 0	3 3

STEAM COCKS.

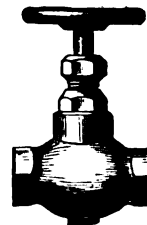
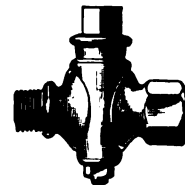
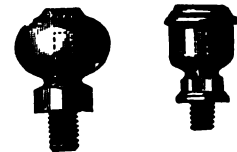
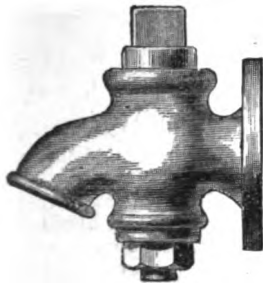
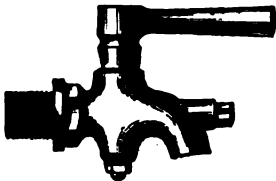
	4 6	7 6
$\frac{1}{8}$	6 6	10 0
$\frac{1}{4}$	9 0	15 0
$\frac{3}{8}$	15 0	22 0
$\frac{1}{2}$	22 0	29 0

STEAM VALVES.

	5 3	8 9
$\frac{1}{8}$	8 0	10 6
$\frac{1}{4}$	11 0	15 0
$\frac{3}{8}$	14 6	22 0
$\frac{1}{2}$	19 6	28 0
2	31 0	42 0

BLOW-OFF COCKS.

	7 6	9 0
$\frac{1}{8}$	10 6	12 6
$\frac{1}{4}$	15 0	18 0
$\frac{3}{8}$	21 0	25 0
2	37 0	42 0



ALEX. WILSON AND CO.,
ENGINEERS, VAUXHALL IRON-WORKS, NINE ELMS, LONDON, S.W.

REFERENCES.

Our Pumps and other Manufactures are used by the following Public Departments, Companies, and Engineering Firms, selected from a List too numerous to publish.

The Admiralty.
The War Department.
The India Office.
The Crown Office of Colonies.

The Queensland Government.
The Trinity House.
The Mersey Docks Board.
The River Wear Commissioners.

The Commissioners of Leith Docks.
The Jersey Harbour Commissioners.
The Cork Harbour " "
The Tees Conservancy " "

RAILWAY COMPANIES.

Great Western Railway Co.
London and North-Western Railway Co.

North-Eastern Railway Co.
London and South-Western Railway Co.

Great Eastern Railway Co.
South-Eastern Railway Co.

STEAM-SHIP COMPANIES AND OWNERS.

Pacific Steam Navigation Co.
British India Steam Navigation Co.
General Steam Navigation Co.
White Star S.S. Co.

Russian Steam Navigation Co.
Compagnie Transatlantique.
Malcolmson, Bros., Waterford.
British and Irish Steam-Packet Co.
Dublin and Liverpool S.S. Co.

Baltischer Lloyd, Stettin.
Bailey and Leatham, Hull.
Currie and Co., Leith.
R. MacAndrew and Co., London.
Ismay and Co., Liverpool.

MARINE ENGINEERS AND SHIPBUILDERS.

Thames Iron-Works and Shipbuilding Co., Limited.
J. and G. Rennie, London.
Humphreys and Tennant, Deptford.
Ravenhill, Eastons, and Co., London.
Samuda, Brothers, Poplar.
J. and W. Dudgeon, Millwall.
Westwood, Baillie, and Co., Poplar.
S. Hodge and Sons, Millwall.
Millwall Docks Engineering Co., Limited.
John Stewart, Blackwall.
Victoria Docks Engine-Works Co., Limited.
Wm. Walker and Co., Deptford Green.
Laird, Brothers, Birkenhead.

Thos. Brassey and Co., Birkenhead.
Geo. Forrester and Co., Liverpool.
Hamilton's Windsor Iron-Works, Limited, Liverpool.
Milford Haven Engineering and Shipbuilding Co., Limited.
James Watt and Co., Soho.
Sir W. G. Armstrong and Co., Elswick.
Palmers and Co., Limited, Jarrow.
R. and W. Hawthorn, Newcastle.
R. Napier and Sons, Glasgow.
Aitken and Mansel, Glasgow.
Blackwood and Gordon, Port Glasgow.
Robert Duncan and Co., Port Glasgow.
Rankin and Blackmore, Greenock.

Steele and Co., Greenock.
Hawthorns and Co., Leith.
Hall, Russell, and Co., Aberdeen.
Cork Harbour Docks Co., Limited.
Courtney, Stephens, and Co., Dublin.
Harland and Wolff, Belfast.
Société Anonyme Nouvelle des Forges et Chantiers de la Méditerranée, Havre.
Société Anonyme des Navales Constructions, Havre.
Arman Père, Bordeaux.
A. Normand, Havre.
W. C. and K. De Wit, Amsterdam.
Rostocker Actien Gesellschaft für Schiff und Maschinenbau.

GENERAL ENGINEERS.

George Adlam and Sons, Bristol.
H. Alexander and Son, Cirencester.
W. Allchin and Son, Northampton.
John Abbot and Co., Limited, Gateshead.
H. T. Balfour and Co., London.
Barnes, Fletcher, and Co., Liverpool.
Bells, Goodman, and Co., Gateshead.

Blackwood and Wood, Liverpool.
Claridge, North, and Co., Bilston.
Clayton and Shuttleworth, Lincoln.
V. and D. Coates, Belfast.
Crawhall and Campbell, Glasgow.
J. and T. Dale, Kirkcaldy.
Davey, Paxman, and Co., Colchester.
Eastons and Anderson, London.

Edwards and Symes, Cubitt Town.
Emerson, Murgatroyd, and Co., Stockport.
Fielding and Platt, Gloucester.
G. Fletcher and Co., London and Derby.
Forrest and Barr, Glasgow.
John Fowler and Co., Leeds.
Fraser, Bros., London.

ALEX. WILSON AND CO.,

ENGINEERS, VAUXHALL IRON-WORKS, NINE ELMS, LONDON, S.W.

GENERAL ENGINEERS—*continued.*

- Galloway, W. and J., Manchester.
 W. and J. Garforth, Manchester.
 R. Garrett and Sons, Suffolk.
 Gilkes, Wilson, Pease, and Co., Middlesboro'.
 Hayward, Tyler, and Co., London.
 Head, Wrightson, and Co., Stockton-on-Tees.
 Hicks, Hargreaves, and Co., Bolton.
 C. D. Holmes and Co., Hull.
 Henry Hughes and Co., Loughborough.
 Manlove, Alliott, and Co., Nottingham.
 Marshall, Osborne, and Co., South Shields.
 Marshall, Sons, and Co., Limited, Gainsborough.
 Platt, Bros., and Co., Limited, Oldham.
 Plenty and Sons, Newbury.
 C. Powis and Co., London.
 A. Ransome and Co., Chelsea.
 Reading Iron-Works Co., Limited, Reading.
 Robey and Co., Limited, Lincoln.
 Ross, Murray, and Co., Dublin.
 Jas. Rowan and Sons, Belfast.
 C. Russell and Co., London.
 Ruston, Proctor, and Co., Lincoln.
 A. Shanks and Sons, Arbroath and London.
 Shand, Mason, and Co., London.
 Siemens, Bros., London.
 Simpson and Co., London.
 Stothert and Pitt, Bath.
 Tangye, Bros., Birmingham.
 J. T. Thornycroft and Co., London.
 Umpherston and Co., Leith.
 Vicarys and Robertson, Exeter.
 R. Waygood and Co., London.
 Willoughby, Bros., Plymouth.
 J. H. Wilson and Co., Liverpool.
 Wimshurst, Hollick, and Co., London.
 Yarrow and Hedley, London.

COLLIERIES, IRON-WORKS, &c.

- Abergavenny Iron Co., Abergavenny.
 Ansley Hall Coal Co., Warwickshire.
 Barrow Hematite Steel Co., Barrow-in-Furness.
 Blaenavon Iron Co., Newport.
 Bridgewater Smelting Co., St. Helens.
 Brynmaur Coal and Iron Co., Newport.
 Thomas Butlin and Co., Wellingborough.
 Calchog and Northop Colliery Co.
 Cannock and Rugeley Colliery Co., Limited.
 Thos. Checkley, Walsall.
 Coanwood Coal Co., Haltwhistle.
 Compagnie Belge, Brussels.
 Dalkeith Collieries, Dalkeith.
 Duffryn Main Colliery Co., Wales.
 East Cannock Colliery Co., Walsall.
 Fried Krupp and Co., Essex.
 Frodringham Iron-Works Co., Brigg.
 Furness Iron and Steel Co., Askam-in-Furness.
 Griffiths, Bros., Mold.
 Kilmersdon Colliery Co., Radstock.
 Lambton Collieries, Fence Houses.
 Landore Steel Co., Swansea.
 Lawton and Harecastle Colliery Co., Stoke-on-Trent.
 Lochgelly Iron and Coal Co., Fife-shire.
 Lochore and Capeldrae Cannel Coal Co., Lochgelly.
 Loftus Iron Co., Saltburn-by-the-Sea.
 Londonderry Colliery, Seaham Harbour.
 Marychurch and Son, Glamorgan.
 Pease, Hutchinson, and Co., Darlington.
 Pelsall Coal and Iron Co., Walsall.
 Price, Dixon, and Co., Workington.
 Shotts Iron Co., Motherwell.
 H. K. Spark, Workington.
 Stanton Iron-Works Co., Mansfield.
 Stapleford Colliery Co., Nottingham.
 Stockingford Colliery Co., Nuneaton.
 Stockton Forge Co., Stockton-on-Tees.
 Threapthwaite Coal Co., Carnforth.
 Thos. Vaughan and Co., Stockton.
 West Yorkshire Iron and Coal Co., near Leeds.
 Winby, Bros., Cardiff.

CHEMICAL WORKS.

- John Bevan, Llanelly.
 Bradburn and Co., Wednesfield.
 Cannock Chase Chemical Works, Lichfield.
 A. J. Dickenson and Co., Deptford.
 East London Saltpetre Works Co., Limehouse.
 John Hutchinson and Co., Widnes.
 Wm. Houlder, Sons, and Co., Southall.
 Jarrow Chemical Works, South Shields.
 Johnson, Matthey, and Co., Hatton Garden.
 Lawes Chemical Manure Co., Limited, London.
 Muspratt and Sons, Widnes.
 Robinson and Co., Portsea.
 W. S. Squire and Co., London.
 Tyne Chemical Works, South Shields.
 Hugh Wallace and Co., London.

GAS AND WATER COMPANIES.

- Bergen Gas-Works, Norway.
 British Gaslight Co., Hull.
 Dewsbury Gaslight Co.
 East London Water-Works.
 Imperial Gaslight Co., London.
 London Gas Co.
 Northampton Gaslight Co.
 Nottingham Water-Works Co.
 Oxford Gaslight Co.
 Phoenix Gaslight Co., London.
 Rio de Janeiro Gas Co.
 Runcorn Water-Works Co.
 Wandsworth and Putney Gas Co.

BREWERS AND DISTILLERS.

- H. K. Aspinall, Wrexham.
 City of Dublin Brewery Co.
 J. W. Clinch, Douglas.
 Daun and Vallentin, London.
 Ind, Coope, and Co., Romford.
 H. Kemp and Co., Brading, I. W.
 John Lovibond and Sons, Greenwich.
 J. and G. Pendreigh, Edinburgh.
 George Roe and Co., Dublin.
 Wm. Smyth and Co., Ardrishaig.
 Taylor and Co., Chelsea.

ALEX. WILSON AND CO.,
 ENGINEERS, VAUXHALL IRON-WORKS, NINE ELMS, LONDON, S.W.

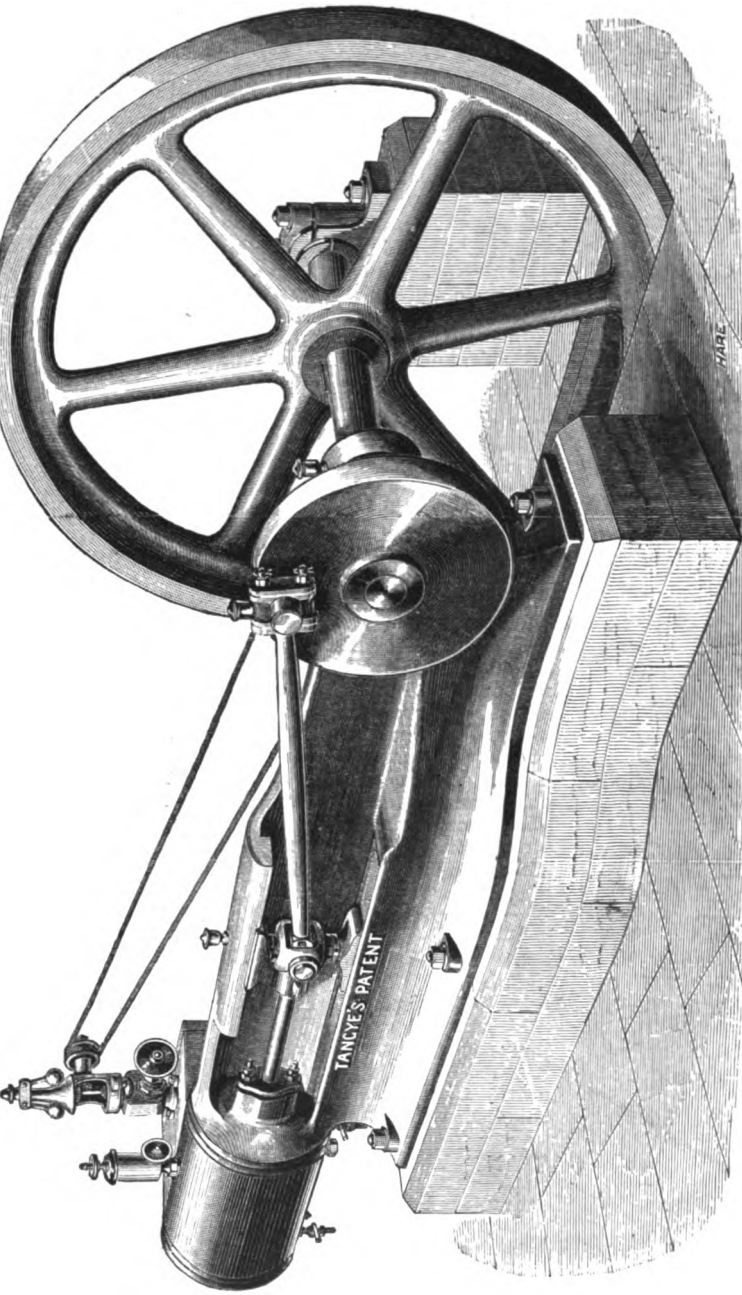


LONDON, 1873.

TANGYE'S HIGH-PRESSURE EXPANSIVE STEAM ENGINE.



VIENNA, 1873.



THE DESIGN, WORKMANSHIP, and LOW PRICE of these ENGINES have called forth UNIVERSAL ADMIRATION, and UPWARDS OF FOURTEEN HUNDRED of them HAVE BEEN SOLD since their introduction in DECEMBER, 1869.

In this Engine the working parts are considerably reduced in number, as compared with Horizontal Engines generally, rendering it far more durable and compact. The bed plate, front cylinder cover, cross-head guides, and plummer block for crank-shaft bearing, are all cast in one piece, the cylinder with its valve chest being bolted to the end of the bed. The cross-head slippers and connecting-rod ends are made adjustable, so that any wear can be readily taken up. The fly wheel, cylinder end, connecting rod, and crank plate, are all bright. All the parts are made to Whitworth's Gauges, and the material and workmanship are of the highest class throughout. The Governor is of a very special description, and combines in the small space usually occupied by the ordinary steam stop-valve, a governor, throttle valve, and stop valve complete. It is exceedingly sensitive, simple, and compact.

FOR PRICES SEE NEXT PAGE.

TANGYE BROTHERS & HOLMAN,
10, LAURENCE POUNTNEY LANE, LONDON, E.C.

PRICES AND PARTICULARS OF
TANGYE'S NEWLY-DESIGNED HORIZONTAL HIGH-PRESSURE STEAM ENGINES.
ILLUSTRATED ON PRECEDING PAGE.

SIZE ..	NOMINAL HORSE-POWER ..	B ..	C ..	D ..	E ..	G ..	H ..	J ..	K ..	M ..
		TWO	THREE	FOUR	SIX	EIGHT	TEN	FOURTEEN	EIGHTEEN	TWENTY-FIVE
PRICE OF ENGINE ..	..	£ 32	£ 38 15s.	£ 46	£ 70	£ 90	£ 115	£ 145	£ 185	£ 200
Feed Pump, with Gun-Metal Working Parts, EXTRA ..	..	3	3 15s.	4	5 10s.	6	7 10s.	8	10	15
Variable Expansion Gear, EXTRA ..	..	4 in.	5 in.	6 in.	8 in.	9 in.	10 in.	12 in.	14 in.	16 in.
Diameter of Steam Cylinder ..	..	8 "	10 "	12 "	16 "	18 "	20 "	24 "	28 "	28 "
Length of Stroke ..	..	..	..	..	..	..	..	..	..	..

PRICES AND PARTICULARS OF TANGYE'S COUPLED HORIZONTAL HIGH-PRESSURE STEAM ENGINES.

SIZE ..	NOMINAL HORSE-POWER ..	B ..	C ..	D ..	E ..	G ..	H ..	J ..	K ..	M ..
		FOUR	SIX	EIGHT	TWELVE	SIXTEEN	TWENTY	TWENTY-EIGHT	THIRTY-SIX	FIFTY
PRICE OF PAIR OF ENGINES ..	..	£ 65	£ 79	£ 94	£ 142	£ 183	£ 235	£ 295	£ 370	£ 410
Feed Pump to each, extra ..	..	6	7 10s.	8	11	12	15	16	20	30
Steam-jacketed Cylinders, extra ..	..	..	..	6	7	8	included	included	included	included
Variable Expansion Gear to each, extra ..	..	..	..	20	24	26	£28	£30	£32	£36
Diameter of Cylinders ..	..	4 in.	5 in.	6 in.	8 in.	9 in.	10 in.	12 in.	14 in.	16 in.
Length of Stroke ..	..	8 "	10 "	12 "	16 "	18 "	20 "	24 "	28 "	28 "

The H J K and M sizes have Steam-jacketed Cylinders. Prices of Boilers on application.

PRICES AND PARTICULARS OF TANGYE'S HORIZONTAL HIGH-PRESSURE STEAM ENGINE WITH VERTICAL BOILER.

SIZE ..	NOMINAL HORSE-POWER ..	B ..	C ..	D ..	E ..	G ..	H ..	J ..
		TWO	THREE	FOUR	SIX	EIGHT	TEN	FOURTEEN
PRICE OF ENGINE AND BOILER COMPLETE ..	..	£ 75	£ 95	£ 110	£ 150	£ 180	£ 225	£ 280
Diameter of Steam Cylinder ..	..	4 in.	5 in.	6 in.	8 in.	9 in.	10 in.	12 in.
Length of Stroke ..	..	8 "	10 "	12 "	16 "	18 "	20 "	24 "

TANGYE'S WINDING ENGINES FOR COLLIERIES. } PRICES ON APPLICATION.
TANGYE'S PUMPING ENGINES.

TANGYE BROTHERS & HOLMAN,

10, LAURENCE POUNTNEY LANE, LONDON, E.C.



PARIS INTERNATIONAL
EXHIBITION, 1887.



VIENNA INTERNATIONAL
EXHIBITION, 1873.

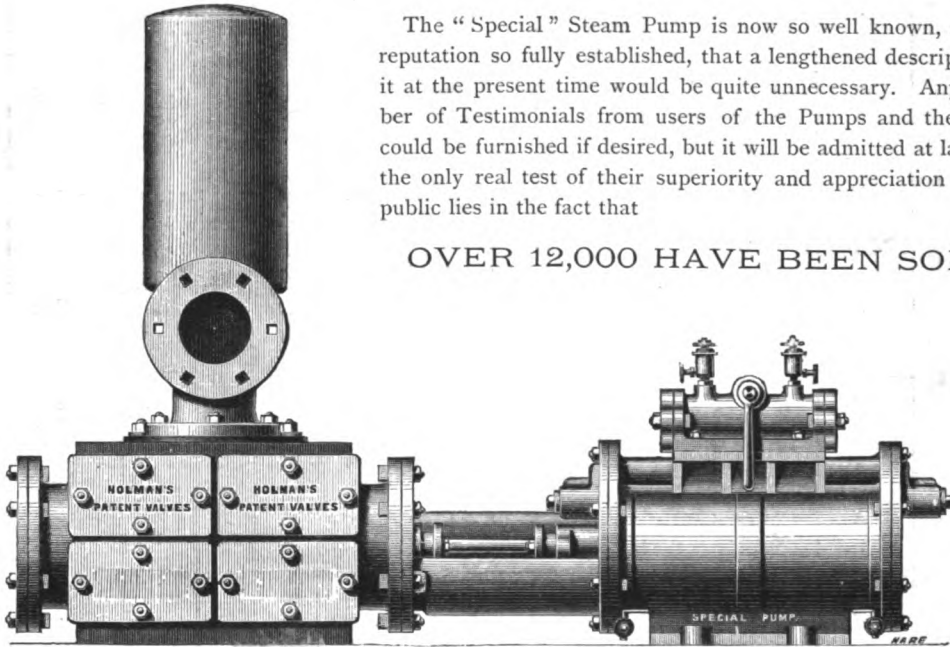


LONDON INTERNATIONAL
EXHIBITION, 1874.



CORNWALL POLYTECHNIC
SOCIETY, 1867 & 1878.

THE "SPECIAL" DIRECT-ACTING STEAM PUMP.



The "Special" Steam Pump is now so well known, and its reputation so fully established, that a lengthened description of it at the present time would be quite unnecessary. Any number of Testimonials from users of the Pumps and the Press could be furnished if desired, but it will be admitted at last that the only real test of their superiority and appreciation by the public lies in the fact that

OVER 12,000 HAVE BEEN SOLD

The "SPECIAL" Steam Pump is adapted for all the purposes for which Steam-driven Pumps are used. Hot or cold fluids, and semi-fluids of almost any consistency are pumped by it with equal facility. It is economical in first cost, occupies very little space, and the wear and tear is reduced to a minimum, because there is absolutely no extraneous gear.

200 SIZES AND COMBINATIONS OF THESE PUMPS ARE NOW MADE FOR EVERY VARIETY OF PURPOSE.

GREAT REDUCTION IN PRICES—SEE NEXT PAGE.

ALL THESE PUMPS ARE FITTED WITH HOLMAN'S PATENT VALVES,
Which are noiseless in operation, durable in wear, afford a free and unobstructed passage, and are readily renewable when required.

THE "SPECIAL" STEAM PUMP CAN BE WORKED BY COMPRESSED AIR AS WELL AS BY STEAM.

MANY HUNDREDS OF THESE PUMPS ARE BEING USED FOR HIGH LIFTS IN MINES, for which purpose they are made with 21 in., 24 in., 26 in., 28 in., 30 in., and 32 in. Steam Cylinders, and 36 in., 48 in., and 72 in. Stroke.

TANGYE BROTHERS & HOLMAN,
10, LAURENCE POUNTNEY LANE, LONDON, E.C.

REDUCED PRICES OF THE "SPECIAL" STEAM PUMPS,

SUITABLE FOR LOW AND MEDIUM LIFTS UP TO 240 FEET.

Diameter of Steam Cylinder	3 in.	3 in.	4 in.	4 in.	4 in.	5 in.	5 in.	6 in.	6 in.	6 in.	7 in.	7 in.	7 in.	8 in.	8 in.
Diameter of Water Cylinder	1½ in.	3 in.	3 in.	4 in.	4 in.	5 in.	5 in.	6 in.	6 in.	6 in.	7 in.	7 in.	7 in.	8 in.	8 in.
Length of Stroke	9 in.	9 in.	9 in.	12 in.	12 in.	12 in.	12 in.	12 in.	12 in.	12 in.	12 in.	12 in.	12 in.	12 in.	12 in.
Gallons per hour, approximate	450	1830	815	1830	3250	1830	3250	1830	3250	5070	7330	1830	3250	5070	7330
REDUCED PRICE	£16	£18	£18	£20	£25	£22	£27	£32	£35	£40	£45	£45	£50	£40	£45

CONTINUED.

Diameter of Steam Cylinder	8 in.	8 in.	9 in.	9 in.	10 in.	10 in.	10 in.	10 in.	10 in.	12 in.	12 in.	12 in.	12 in.	12 in.	12 in.
Diameter of Water Cylinder	7 in.	8 in.	8 in.	9 in.	9 in.	10 in.	10 in.	10 in.	10 in.	12 in.	12 in.	12 in.	12 in.	12 in.	12 in.
Length of Stroke	12 in.	12 in.	12 in.	12 in.	12 in.	12 in.	12 in.	12 in.	12 in.	12 in.	12 in.	12 in.	12 in.	12 in.	12 in.
Gallons per Hour, approximate	9750	13000	5070	7330	9750	13000	16519	5070	7330	13000	16519	20000	7330	9750	13000
REDUCED PRICE	£55	£65	£50	£55	£60	£75	£85	£55	£65	£75	£80	£85	£110	£120	£140

CONTINUED.

Diameter of Steam Cylinder	14 in.	14 in.	14 in.	14 in.	16 in.	16 in.	16 in.	16 in.	16 in.	18 in.	18 in.	18 in.	21 in.	21 in.	24 in.
Diameter of Water Cylinder	7 in.	8 in.	9 in.	10 in.	10 in.	10 in.	10 in.	10 in.	10 in.	12 in.	12 in.	12 in.	14 in.	14 in.	14 in.
Length of Stroke	24 in.	24 in.	24 in.	24 in.	24 in.	24 in.	24 in.	24 in.	24 in.	24 in.	24 in.	24 in.	36 in.	36 in.	36 in.
Gallons per Hour, approximate	9750	13000	16519	20000	30000	40000	13000	16519	20000	30000	40000	30000	40000	30000	40000
REDUCED PRICE	£110	£120	£130	£140	£160	£180	£200	£150	£160	£220	£240	£285	£305	£305	£450

If Brass-lined, or Solid Brass or Gun-Metal Water Cylinders with Copper Air-Vessels, extra, according to size.

Any combinations can be made between the Steam and Water Cylinders to suit Pressure of Steam and Height of Lift, thus—8 in. Steam and 3 in. Water, or 10 in. Steam and 3 in. Water, and so on. The length of Stroke can also be increased at a proportionate extra charge.

Intending Purchasers of Steam Pumps would do well to observe the great length of stroke, short steam cylinder, and short piston of the "Special" Steam Pump, as compared with the short stroke, long steam cylinder, and long piston of the pumps of other Makers, as the efficiency and durability of the machine, and the space occupied by same, greatly depends upon this. The advantage of long strokes will be obvious when Purchasers are reminded that each set of suction and delivery valves of a "Special" Steam Pump with 24-inch stroke, running at 120 feet per minute, would open and close only 30 times per minute, as against 120 times per minute in a Pump with only 6-inch stroke performing same duty.

TANGYE BROTHERS & HOLMAN,
10, LAURENCE POUNTNEY LANE, LONDON, E.C.

THE "SPECIAL" STEAM PUMP,

WITH VERTICAL CROSS-TUBE BOILER,
AND BOILER FEEDER COMPLETE.

Amongst the many uses for which the "Special" Steam Pump with Boiler is eminently adapted and has been successfully applied, the following may be mentioned, viz.:

For filling Tanks from Wells, or other sources, for Locomotives at Railway Stations.

For supplying water from a Stream or Well to Mansions, Farms, Asylums, Hospitals, Hotels, Public Buildings, Breweries, Paper Mills, Dye Works, and Factories generally.

For supplying water from Wells or other sources, to Villages and small Towns.

For Pumping in Quarries.

For use as an auxiliary Pump in Mines.

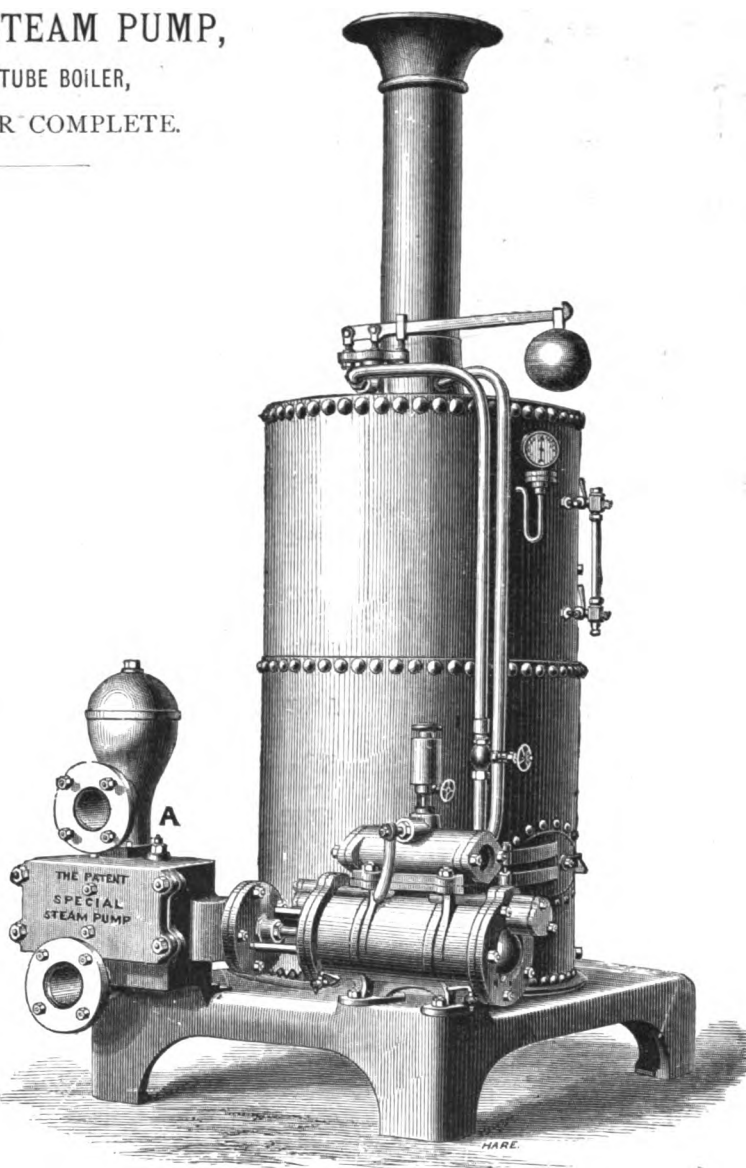
For pumping out Cofferdams.

For placing on board a Barge, and irrigating land on either side of a River.

For placing on board a Barge, and pumping out and raising sunken Ships.

For pumping fresh water from a Tank Boat into Ships.

For pumping salt water from the Sea, to supply Public Baths, Aquariums, &c.



SIZES AND PRICES OF THE "SPECIAL" STEAM PUMP WITH BOILER, &c., COMPLETE.

Dia. of Steam Cylinder....in.	3	4	4	4	6	6	6	6	7	7	7	8	8	8	10	12
Dia. of Water Cylinder....in.	1½	2	3	4	3	4	5	6	5	6	7	6	7	8	8	9
Length of Stroke .....in.	9	9	12	12	12	12	12	12	12	12	12	12	12	18	18	18
Gallons per hour	450	815	1830	3250	1830	3250	5070	7330	5070	7330	9750	7330	9750	13000	13000	16519
Dia. of Suction & Delivery . in.	1	1½	2	3	2	3	3½	4	3½	4	5	4	5	6	6	7
PRICE { Complete with Boiler and fittings. Injector Boiler Feeder £7 extra.	56	60	65	70	75	85	100	105	105	110	115	125	130	145	175	195

If Brass-lined, or Solid Brass or Gun-Metal Water Cylinders with Copper Air-Vessels, extra, according to size.

TANGYE BROTHERS & HOLMAN,
10, LAURENCE POUNTNEY LANE, LONDON, E.C.

Holman's Patent Self-acting Exhaust Steam Condensers,

FOR ALL KINDS OF STEAM PUMPS AND HIGH-PRESSURE STEAM ENGINES,

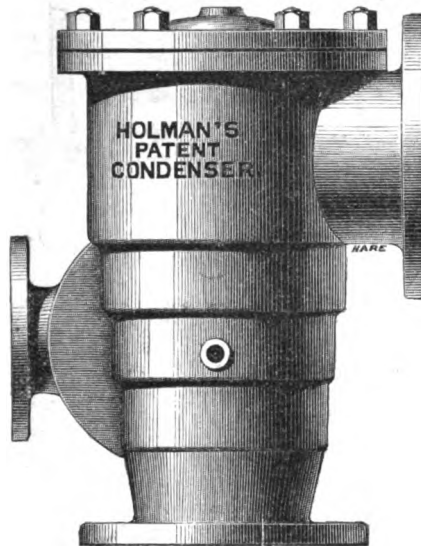
SAVES 20 TO 50 PER CENT. OF FUEL.

These Condensers are made to suit any kind and size of Steam Pump. They form a part of the suction pipe of the Pump, and while they effectually condense the exhaust Steam, they produce a vacuum of about 11 lb. per square inch on the steam piston, giving a saving of from 20 to 50 per cent. in fuel, and increasing to a corresponding extent the economy and efficiency of the Pump. In mining operations, and to users of Steam-pumping and other High-pressure Steam Engines, these Condensers will be of great value. All Boiler Feeders are recommended to be fitted with these Condensers, as the exhaust steam is utilized in heating the feed water and returned with it into the Boiler.

—
TURNS WASTE STEAM INTO
GREAT POWER.

PREVENTS ALL ESCAPE OF
STEAM IN MINES AND
ELSEWHERE.

CONTAINS NO STUFFING
BOXES.



PERMITS A CONTINUOUS FLOW
OF WATER.

SAVES HALF ITS COST IN CON-
NECTIONS AND PIPES.

OCCUPIES NO EXTRA SPACE.

IS ENTIRELY SELF-ACTING.

The accompanying Testimonial gives one example of the great advantage gained by the Patent Condenser :

Norley Colliery, Wigan.

16th October, 1874.

MESSRS. TANGYE BROS. & HOLMAN,

Gentlemen,—I have great pleasure in recording my entire satisfaction with the working of Holman's Patent Steam-Pump Condenser, which you have supplied to us.

The complete condensation of the Steam is, apart from its value in the strict economic sense, a most valuable feature in the Drainage of Underground Workings; the perfect manner in which this important result is accomplished by your Condensers is extremely creditable to you, and merits the thanks and commendation of the Mining Engineer. When we start the "Special" Steam Pump the Condenser commences working automatically,

and maintains a constant vacuum of $10\frac{1}{2}$ lb. per square inch even when we run the pump upwards of 80 strokes per minute. It may perhaps be interesting to you to know that when we were running the pump at 84 strokes (168 feet) per minute, the steam gauge indicating a Steam-pressure of 36 lb. per square inch 80 yards from the pump, and the Condenser vacuum gauge (on the exhaust pipe) indicating a steady vacuum $21\frac{1}{2}$ inches, I turned the exhaust steam from the Condenser into the atmosphere, when the speed at once fell to 44 strokes per minute.

The working economy thus shown is really so great that the cost of the Condenser must be saved in a very short time indeed.

(Signed) J. THOMPSON.

Under date Nov. 19th, 1874, Mr. THOMPSON writes, supplementing the above Testimonial with the following remarks :

"I have to-day measured accurately the delivery of the water, first with the Condenser at work, and subsequently discharging the exhaust steam into the atmosphere, without any perceptible difference in the quantity of water delivered, the Pumps running the same number of strokes in each case. (The steam being turned down to a lower

pressure when the Condenser was put in action in order that the Pump should run the same speed with as without the Condenser.) I repeated the Tests several times with precisely the same result, one test being made at the high speed of 120 strokes per minute."

The Steam Cylinder of the Pump referred to in the foregoing testimonial is double the diameter, or four times the area of the Pump Cylinder, hence a gain of $10\frac{1}{2}$ lb. per square inch on the Steam Piston gives a useful effect of 43 lb. per square inch on the Water Piston; thus a lifting power equal to about 90 feet head is obtained by the action of the Condenser alone, and a proportionate saving of fuel effected.

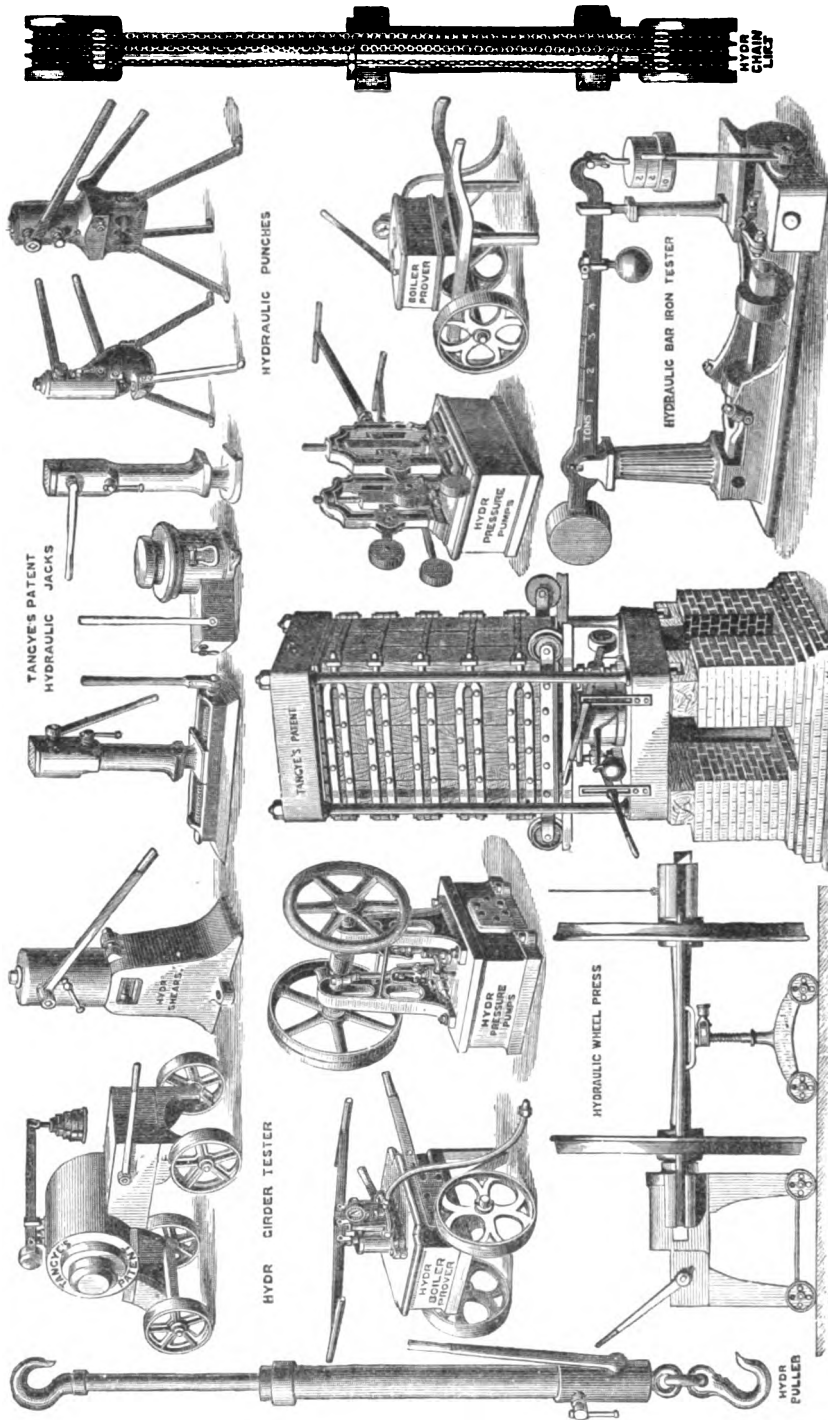
The Condenser referred to in the above testimonial was of sufficient power to condense the steam from a much larger Cylinder, so that the economy will be greater in High-lift Engines, where larger Steam Cylinders, in proportion to the size of the Pump Cylinders, are used.

Prices, 30s. to 40s. per inch diameter of Steam Cylinders, according to the relative diameters of Steam and Pump Cylinders for which Condensers are required.

TANGYE BROTHERS & HOLMAN,

10, LAURENCE POUNTNEY LANE, LONDON. E.C.

TANGYE'S SPECIALITIES IN HYDRAULIC MACHINERY.



FOR PRICES SEE NEXT PAGE.

TANGYE BROTHERS & HOLMAN,
10, LAURENCE POUNTNEY LANE, LONDON, E.C.

HYDRAULIC MACHINERY.

PRICES OF TANGYE'S PATENT HYDRAULIC JACKS.

To lift 4	6	8	10	12	15	20	30	40	50	60 Tons.
£6.	£7 10s.	£8 10s.	£10.	£12.	£13 10s.	£16.	£18.	£20.	£23 10s.	£27 10s.
Traversing 4 to 12 tons £3, and 12 to 20 tons £5 extra.										

PRICES OF TANGYE'S PATENT HYDRAULIC SHIP-JACKS.

To lift 20	35	50	70	100	150	200 Tons.
£10 10s.	£13 10s.	£16 10s.	£18 10s.	£20.	£25.	£30.

PRICES OF TANGYE'S PATENT HYDRAULIC PUNCHING BEARS.

To punch $\frac{3}{4}$ in. thro' $\frac{1}{2}$ in.	1 in. thro' $\frac{3}{4}$ in.	$1\frac{1}{4}$ in. thro' 1 in.	1 in. Steel Rails.
£10.	£15.	£26.	£35.
Inclusive of one Punch and Die. Extra Punches and Dies, 10s. pair.			

PRICES OF TANGYE'S PATENT HYDRAULIC PUNCHING BEARS, FOR ANY SECTION OF RAILS.

To punch $\frac{3}{4}$ in. thro' $\frac{1}{2}$ in.	1 in. thro' $\frac{3}{4}$ in.	$1\frac{1}{4}$ in. thro' 1 in.	1 in. Steel Rails.
£14.	£20.	£30.	£38.
Inclusive of one Punch and Die. Extra Punches and Dies, 10s. pair.			

PRICES OF TANGYE'S PATENT HYDRAULIC SHEARS.

To cut up to $1\frac{1}{2}$ in. square or round, or 3 in. by $\frac{1}{2}$ in. Bar by hand	..	..	..	£16 0 0
„ 2 in. „ „ 4 „ $\frac{3}{4}$ „ „ „	..	..	..	21 0 0
Weight, 230 and 380 lb. respectively.				

PRICES OF TANGYE'S PATENT HYDRAULIC GIRDER-TESTER.

To test to 50	100	150	200 Tons.
£25.	£35.	£45.	£70.

PRICES OF TANGYE'S BOILER PROVERS.

Tripod Boiler Prover, to test to 200 lb. square in., including Gauge and flexible Suction and Delivery Pipe, £8.

Barrow Boiler Prover, to test to 200 lb. square inch, with Cast-iron Cistern, mounted on Barrow, Gauge, and flexible Suction and Delivery Pipe, £14 10s.

These Boiler Provers can be made for any greater pressure.

PRICES OF TANGYE'S PATENT HYDRAULIC WHEEL-PRESSES.

For forcing railway carriage, waggon, and locomotive wheels on and off their axles.

50	75	100	150 tons power.
£40.	£45.	£90.	£120.

HYDRAULIC TESTING MACHINES,

For testing bar iron, chains, anchors, railway couplings, cast-iron pipes, railway springs, &c.

PRICES ON APPLICATION.

HYDRAULIC LIFTS, ACCUMULATORS, AND PRESSURE PUMPS

Of every description. Prices according to requirements.

HYDRAULIC PRESSES AND PRESSURE PUMPS

Suitable for all parts of the world, for baling cotton, wool, jute, hay, Esparto grass, hides, rags, &c.

Also for the use of packers, bookbinders, printers, paper makers, &c., &c.

Prices according to size and description required.

HYDRAULIC OIL MACHINERY OF EVERY DESCRIPTION.

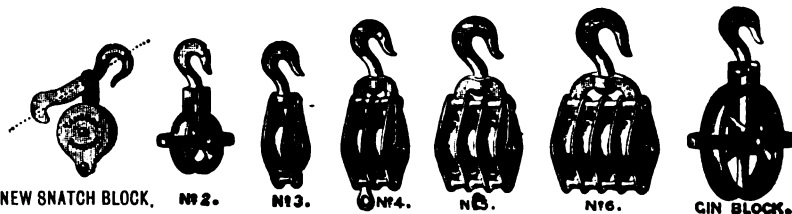
TANGYE BROTHERS & HOLMAN,

10, LAURENCE POUNTNEY LANE, LONDON, E.C.

BEST WROUGHT-IRON (LONDON PATTERN) PULLEY BLOCKS.

For $\frac{3}{4}$ inch to
3 $\frac{1}{4}$ inch diameter
ROPE, or
for $\frac{3}{8}$ inch to
 $\frac{1}{2}$ in. CHAIN.

Eight
Sheaves and
Turned Pins.



All
Machine-made.

All Parts In-
terchangeable.

Several
Thousand in
Stock.

Diameter of Sheave and Width of Groove In. }	2 $\frac{1}{2}$ X $\frac{1}{2}$	3 $\frac{1}{2}$ X $\frac{1}{2}$	4 X $\frac{1}{2}$	4 $\frac{1}{2}$ X $\frac{1}{2}$	5 X $\frac{1}{2}$	6 X 1	7 X 1 $\frac{1}{2}$	8 X 1 $\frac{1}{2}$	9 X 1 $\frac{1}{2}$	10 X 2	11 X 2 $\frac{1}{2}$	12 $\frac{1}{2}$ X 2 $\frac{1}{2}$	14 X 2 $\frac{1}{2}$	15 X 3	16 X 3 $\frac{1}{2}$
Snatch Block, Price of ea.	6/0	6/0	7/0	8/6	11/6	13/6	16/6	21/6	32/0	60/0	80/0	110/0	140/0	170/0	210/0
1 Sheave Block,	4/0	4/6	5/9	7/6	10/0	11/6	14/0	19/0	30/0	52/6	72/0	98/0	110/0	130/0	164/0
2	5/6	7/0	8/6	11/0	15/6	17/0	24/6	35/6	50/0	98/0	124/0	144/0	170/0	203/0	242/0
3	7/0	8/6	10/6	14/0	19/6	21/6	30/6	48/6	70/0	127/0	157/0	190/0	222/6	262/0	310/0
4	8/6	10/0	12/6	18/6	25/6	28/6	46/0	63/0	92/6	157/0	190/0	222/6	280/0	352/0	400/0

WESTON'S PATENT DIFFERENTIAL PULLEY BLOCKS.

NEARLY 100,000 SETS HAVE BEEN SOLD.

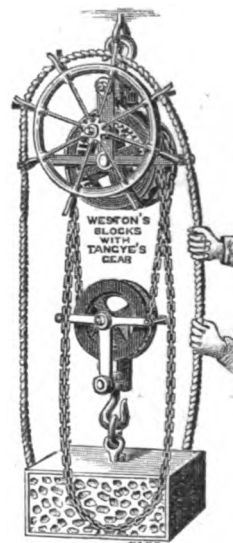
Adopted in all the principal Workshops in the World.



Tested to	Price of Blocks per Set.	If Fitted with Spocket Wheel.	Bright Chain per Foot.
5 cwt.	12/6	..	0/6
10 ..	20/0	..	0/6
12 ..	20/0	..	0/7
20 ..	30/0	..	0/9
30 ..	40/0	..	0/10
40 ..	50/0	75/0	0/11
60 ..	100/0	110/0	1/1
80 ..	120/0	135/0	1/3

WESTON'S BLOCKS WITH TANGYE'S GEAR.

Tested to	Price of Blocks per Set.	Bright Chain per Foot.
4 tons	135/0	1/3
5 ..	200/0	1/6
6 ..	240/0	2/4
8 ..	320/0	3/0
10 ..	400/0	3/6



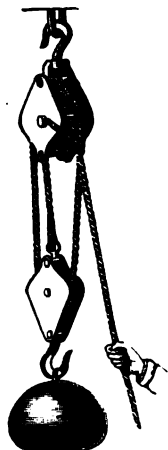
ROPE EXTRA.

TANGYE'S SELF-SUSTAINING ROPE PULLEY BLOCKS.

(HEWITT AND GOFF'S PATENT.)

Numerous applications having, from time to time, been received by Messrs. TANGYE for a Self-sustaining Pulley Block, quicker in action than Weston's Differential Pulley Block, and fitted with rope instead of chain, have led to the introduction of the annexed, which is confidently recommended as meeting all requirements.

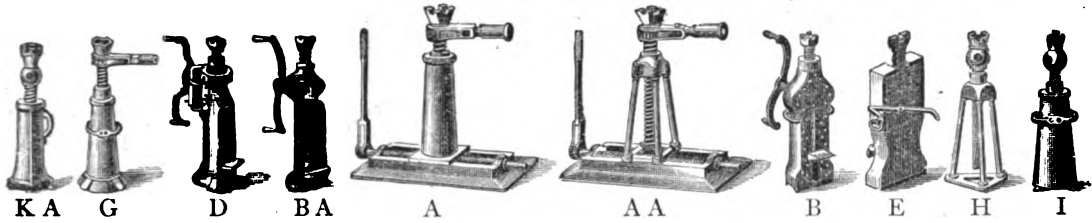
Diameter of Sheave	2 $\frac{1}{2}$ in.	3 $\frac{3}{8}$ in.	4 in.	4 $\frac{3}{8}$ in.	5 in.	6 in.
Width of Groove	$\frac{3}{8}$..	$\frac{1}{2}$..	$\frac{5}{8}$ in.	$\frac{3}{4}$..	$\frac{7}{8}$..	1 ..
Price of Pair of 1 and 1-sheave Blocks with rope for 10 feet lift	18/9	20/0	23/9	28/6	36/6	41/6
Price of Pair of 1 and 2-sheave Blocks with rope for 10 feet lift	21/6	24/9	28/6	34/6	46/6	51/0
Price of Pair of 2 and 3-sheave Blocks with rope for 10 feet lift	28/6	32/9	37/6	46/6	63/0	69/6
Price of Pair of 3 and 3-sheave Blocks with rope for 10 feet lift	31/6	36/6	41/9	52/0	70/0	77/6



TANGYE BROTHERS & HOLMAN,
10, LAURENCE POUNTNEY LANE, LONDON, E.C.

LIFTING JACKS AND CRANES.

TANGYE'S IMPROVED SCREW LIFTING JACKS.

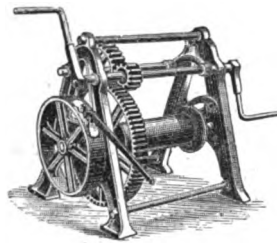


Tons.	1½	2	3	4	5	6	8	10	12	14	15	16	20
A or AA	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.
B or BA		4 10		5 0		6 10	7 0	8 0	7 15		9 15	15 0	12 5
D						5 15	7 0	8 0	9 0				18 10
E			7 0	7 10		8 10	9 10	10 10	12 0		15 0		
G						3 17	4 10	5 7	6 10				
H or I	1 4	1 7	1 12	1 18	2 5	3 0	3 13	4 10	5 10	6 7		6 17	
KA	17s. 6d.	1 0		22s. 6d.	1 6	1 10	2 0	2 10					

TANGYE'S IMPROVED HOISTING CRABS.

SINGLE PURCHASE.

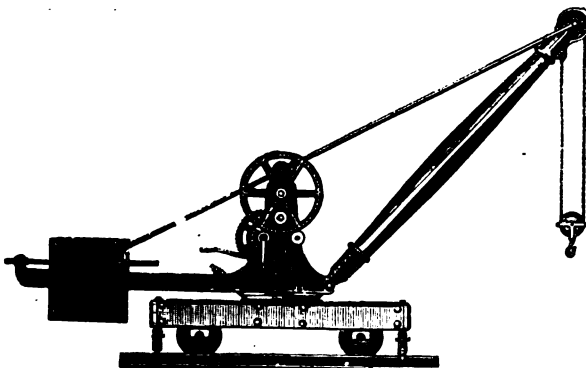
To lift with 2 & 3 Sheave Pulley Blocks.	PRICE without Break.	PRICE with Break.
2 Tons.	£ s. d.	£ s. d.
3 "	3 0 0	4 2 6
4 "	3 7 6	4 12 6
5 "	4 5 0	5 10 0
6 "	5 0 0	6 10 0
7 "	6 5 0	7 15 0
8 "	7 5 0	8 15 0



Brass Bushing, extra.

DOUBLE PURCHASE.

To lift with 1 & 2 Sheave Pulley Blocks.	PRICE without Break.	PRICE with Break.
4 Tons	£ s. d.	£ s. d.
5 "	5 5 0	6 10 0
6 "	6 0 0	7 10 0
7 "	7 7 6	8 17 6
8 "	8 5 0	9 17 6
9 "	10 0 0	12 0 0
12 "	13 12 0	15 15 0
15 "	17 5 0	19 10 0
18 "	21 0 0	23 10 0

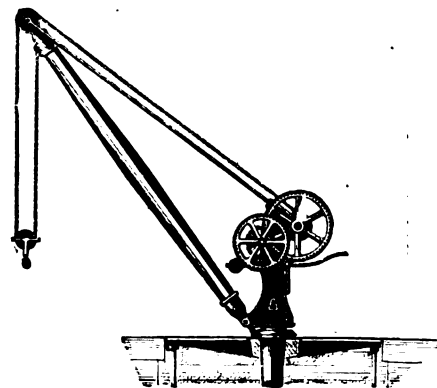
TANGYE'S PORTABLE HAND-CRANE
FOR RAILWAYS OR ROADS.

PRICES.

To lift	12 cwt.	8 Feet Radius	£40
"	1 ton	8 "	45
"	2 "	10 "	65
"	3 "	12 "	95
"	4 "	12 "	120
"	5 "	14 "	145
"	6 "	14 "	170
"	10 "	14 "	250
"	12 "	14 "	275

Wrought-iron Clips for Rails, from 30s. to 70s. per set extra.

TANGYE'S HAND WHARF CRANE.



PRICES.

To lift	12 cwt.	8 Feet Radius	£30
"	1 ton	8 "	38
"	2 "	10 "	50
"	3 "	12 "	66
"	4 "	12 "	85
"	5 "	14 "	110
"	6 "	14 "	135
"	8 "	14 "	160
"	10 "	14 "	195

TANGYE BROTHERS & HOLMAN

10, LAURENCE POUNTNEY LANE, LONDON, E.C.

MILLSTONES.

W. R. DELL AND SON have now the largest and most varied Stock of FRENCH BURRS of any house in London, and from their experience of the kind of stone best adapted for grinding various classes of substances, are able to guarantee satisfaction.

MILLSTONES

FOR WHEAT,

BARLEY,

RIVETS,

CEMENT,

COPROLITES,

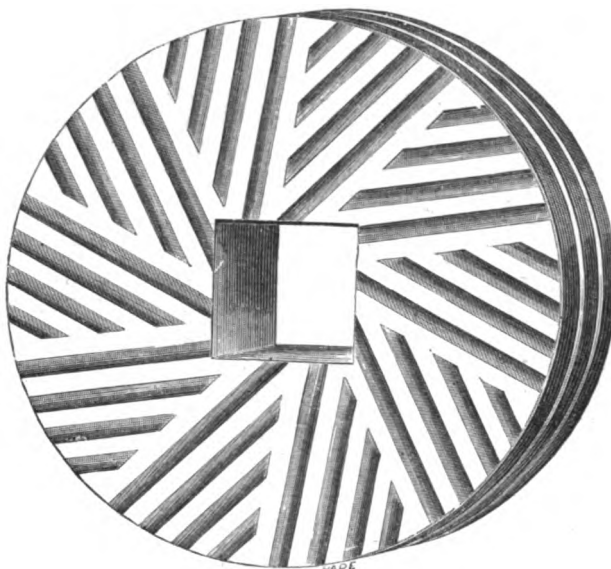
BARYTES,

PAINT,

DRUGS,

SPICES,

COCOA.



PEAK OR DERBY-
SHIRE GREY
STONES.

COLOGNE STONES.

GRANITE STONES for
Edge Runners.

YORKSHIRE STONES
for ditto.

NEWCASTLE GRIND-
STONES.

STONES for Grinding
Wood for Paper
Making, &c., &c.

This department of the business of Mill Furnishing is of too varied a character for a List of Prices to be possible which would be any real guide to purchasers, as the requirements of different countries and even of different parts of the same country for doing the same work vary greatly; but Prices will always be gladly furnished on application.

MILLSTONES FOR GRINDING PORTLAND CEMENT are a speciality with W. R. D. & SON, they having for many years supplied some of the principal makers of that article with their Millstones.

All Stones when not otherwise ordered are built to the standard specification of the principal London Cement houses.

THE "ECONOMIC" FLOUR FEEDER MIXER.



With this very simple Machine, Millers entirely overcome the difficulty that has been experienced by them in feeding and *evenly* mixing flours of different qualities in the *desired proportions*.

Any required quantity (from one peck to four or five sacks per hour) of Foreign Flour, Flour from double ground sharps, &c., can be mixed with undeviating regularity, with the Meal passing *into* a Dressing Machine, or with the Flour coming *from* it. Some Millers prefer the former, whilst for others the latter is the most convenient plan.

Its construction is so simple that it is impossible for it to get out of order. Being a very small Machine it can be placed in almost any desired position, the extreme dimensions being: height, 2 feet 6 inches; length, 2 feet; breadth, 2 feet.

It enables the Flour at once to be packed into sacks.

It saves time and an immensity of labour, and blends the Flour in a manner unattainable by hand labour.

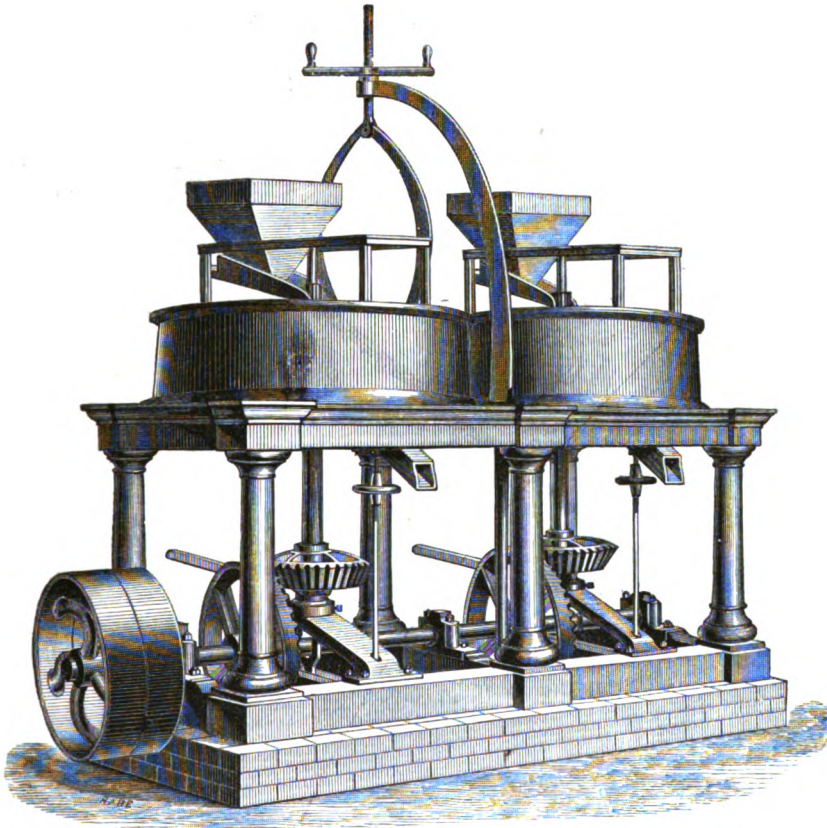
Speed of eccentric, 20 to 25 revolutions per minute; diameter of pulley, 8 inches.

PRICE £6 NET. FREE ON RAILS IN LONDON.

All kinds of Wheat-cleaning Machines and other Mill Work, St. James's Iron Works, Croydon.

WM. R. DELL AND SON,
MILLSTONE BUILDERS AND GENERAL MILL FURNISHERS, 26, MARK LANE,
LONDON.

IMPROVED IRON FRAME DOUBLE GRINDING MILL, FOR TWO PAIRS OF STONES.



The above Engraving represents an improved design for Independent Double Iron Hursts for Two Pairs of Stones, with all the latest improvements—Mortise Driving Wheel, Iron Pinions, pitched and trimmed, Adjusting Screws, Disengaging Gear, Stone Crane, and Fast and Loose Pulley. The whole is fitted up in the best possible manner, and forms a substantial Mill at very small cost in fixing.

IMPROVED IRON FRAMED INDEPENDENT CORN MILLS.

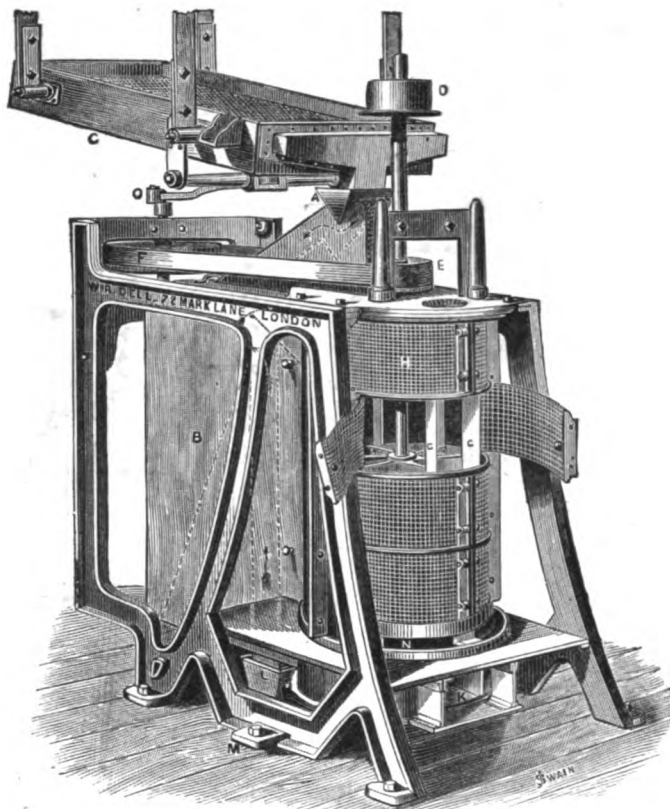
Diameter of Stones	SINGLE.			
	30 in.	36 in.	42 in.	48 in.
With French Burr Stones	£ 48 0 0	£ 62 0 0	£ 76 0 0	£ 94 0 0
French Burr Bedstone and Derbyshire Runner	46 0 0	56 0 0	69 0 0	84 0 0
With Derbyshire Stones	40 0 0	50 0 0	62 0 0	74 0 0
If with Wheels, one with wood and one with iron teeth, and both pitched and trimmed, extra	1 15 0	1 17 6	2 2 0	2 10 0
Pair of Fast and Loose Pulleys	2 0 0	2 10 0	2 15 0	3 0 0
Stone Crane	6 10 0	6 15 0	7 10 0	8 0 0

Double Corn Mills double the price of Single.

WM. R. DELL AND SON,
MILLSTONE BUILDERS AND GENERAL MILL FURNISHERS, 26, MARK LANE,
LONDON.

THE "ECONOMIC" SMUT MACHINE AND SEPARATOR.

W. R. D. & S. have for many years devoted special attention to Machines for Cleaning and Decorticating Wheat, and are able to offer machines suited to the requirements of any style of Mill, whether large and small, ranging in Price from £12 12s. to £120.



This machine consists, first, of a Separator, with two or more sieves. The top one takes out stones, nails, and any extraneous matter larger than wheat; the lower one removes all loose dust, small seeds, &c. The wheat then passing over this sieve is delivered into the hopper, A, and as it falls a current of air is drawn through it, which takes away the smut-balls, WITHOUT BEING BROKEN, before the wheat enters the scouring part of the apparatus. From the hopper the wheat passes between two corrugated metal plates, which distribute it over the surface of the Cylinder; it is then subjected to the process of severe friction, by the beaters throwing off the wheat in such a manner that the grain itself materially assists the work of cleaning. After it leaves the Cylinder the wheat falls into an exhaust spout, through which a strong current of air is passing to the fan, holding the grain in suspension, and effectually separating all remaining impurities; the light and unsound corn is deposited in a chamber arranged for the purpose, which can be drawn off at a sleeve. The power of the fan is regulated by an adjustable valve.

The Cylinder is encircled with a casing of sheet iron, and being open to the fan below all dust is at once drawn away; a strong and continuous current of air through every part of the machine effectually prevents any deposits, the great advantage of which will be at once recognized by every practical miller. All the bearings and brasses are thus kept free from dust, and can be oiled and attended to while the machine is at work.

No.	Width.	Length of Frame.	Height.	Height to top of Sifter.	Diam. of Cylinder.	Length of Cylinder.	Power.	Capacity per Hour.	Revolutions per Minute.	PRICE IN LONDON.					
										Without Separator.			With Separator, complete.		
	ft. in.	ft. in.	ft. in.	ft. in.	in.	ft. in.	h.-p.	bush.		£	s.	d.	£	s.	d.
1	2 6	4 10	4 3	6 0	14	2 2	1½	40	650	20	0	0	31	0	0
2	2 6	4 10	5 3	6 8	14	2 6	2	50	650	25	0	0	35	0	0
3	2 9	5 6	5 3	6 8	16	2 6	2	70	600	35	0	0	40	0	0
4	3 0	6 0	5 9	6 10	18	2 10	3	80	500	40	0	0	50	0	0
5	3 6	6 0	5 9	7 0	22	2 10	4	100	450	50	0	0	60	0	0
6	3 9	6 6	6 3	7 6	22	3 6	5	120	450	60	0	0	75	0	0

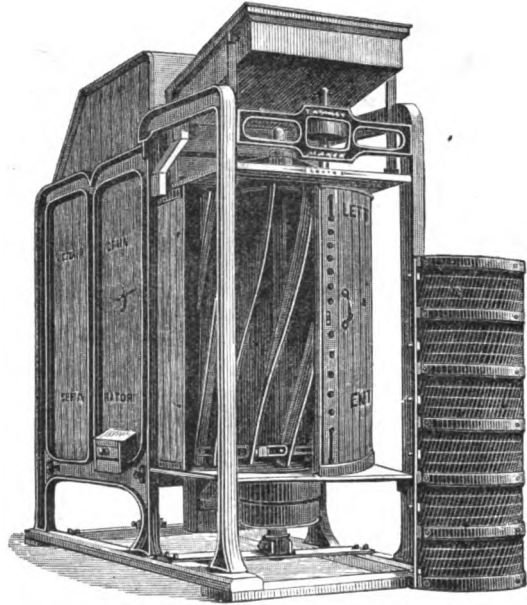
WM. R. DELL AND SON,

MILLSTONE BUILDERS AND GENERAL MILL FURNISHERS, 26, MARK LANE, LONDON.

The "Victoria" Combined Double Aspirator, Separator, and Smutter.

PATENTED IN GREAT BRITAIN, FRANCE, BELGIUM, AND THE UNITED STATES OF AMERICA.

This Machine is complete in itself, and its wide range of capabilities renders it one of the most perfect Machines known. All kinds of grain and seed can be cleansed and separated by this apparatus, and any grain or seeds that may require scouring can be passed through the scouring cylinder, which is of peculiar construction and of ample dimensions; and any class of grain or seed requiring to be operated upon that does not require scouring can be passed through the separator and double exhaust without entering the scouring cylinder. The change in the Machine is effected instantaneously whilst in motion, by the action of a change valve. This valuable and useful Machine is most simple and effective, and of superior and solid construction.



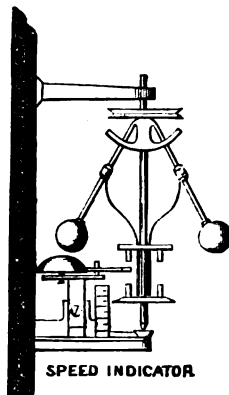
No.	Extreme Height.	Size on Floor.		Weight.	Speed of Main Shaft.	Diameter of Driving Pulley.	Capacity in Bushels per hour.	Length of Cylinder.	Diameter of Cylinder.	Price on Rail at Louth.
1	ft. in. 8 0	ft. in. 8 3	ft. in. by 3 6	cwt. 30	550	in. 14	80 to 110	ft. in. 4 2	in. 30	£ 120
2	7 4	8 3	„ 3 6	25	550	14	60 „ 100	3 6	30	100
3	6 4	7 2	„ 2 8	20	700	12	40 „ 60	2 10	24	80

SPEED INDICATOR

This apparatus is invaluable where a silent feed is employed, and is extremely simple in operation.

HOPKINSON'S PATENT SILK FLOUR DRESSING MACHINE.

Price, from £70 to £110 complete with cloth.



FOR MILLSTONES.

PRICE.

Small Size £3 3 0

Large Size, with dial 7 10 0

FAIRCLOUGH'S PATENT MIDLINGS PURIFIER.

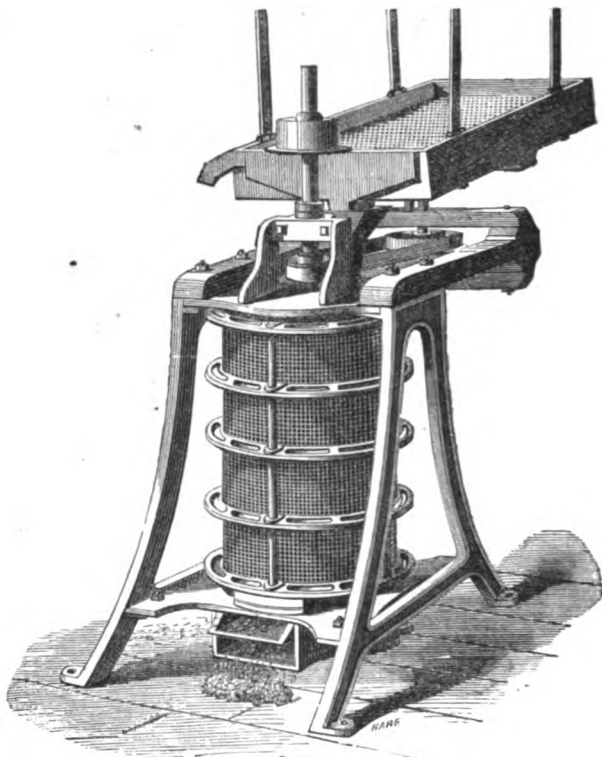
Price, £110, £130, and £150, according to size.

WM. R. DELL AND SON,

MILLSTONE BUILDERS AND GENERAL MILL FURNISHERS, 26, MARK LANE,
LONDON.

K

THE "ECLIPSE" SMUT MACHINE AND SEPARATOR.



The importance of having a Separator or Sifter attached to the Smut Machine has induced W. R. DELL AND SON to make an arrangement for this purpose of so simple a character as not to involve any additional machinery to work it, while the power required will scarcely be perceived, and the cost of the whole is so moderate as to make it at once the cheapest and best machine of the kind.

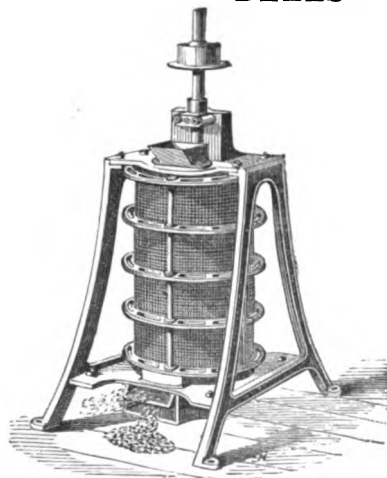
The Separator consists of two or more sieves; the upper one takes out stones, nails, sack tyers, &c., and the lower sieve separates the small seeds and dust from the wheat, which then passes into the Smutter, where it is subjected to a process of severe friction, first by passing between two corrugated metal plates, next between two cylinders of rough wire, with beaters, which will pulverize the hardest pieces of dirt without breaking the wheat, which then falls before the blast of a powerful wind-fan attached, and is thoroughly cleansed from all impurities.

No.	Sheets Long.	Speed.	Diameter of Cylinder.	Will Clean per Hour.	Price
1	.. 4 ..	700	.. 14 inches ..	40 to 45 Bushels.	£20.

DELLS' "UNIQUE" SMUT MACHINE.

FOR SMALLER MILLS.

No. 1. PRICE £12 12s.



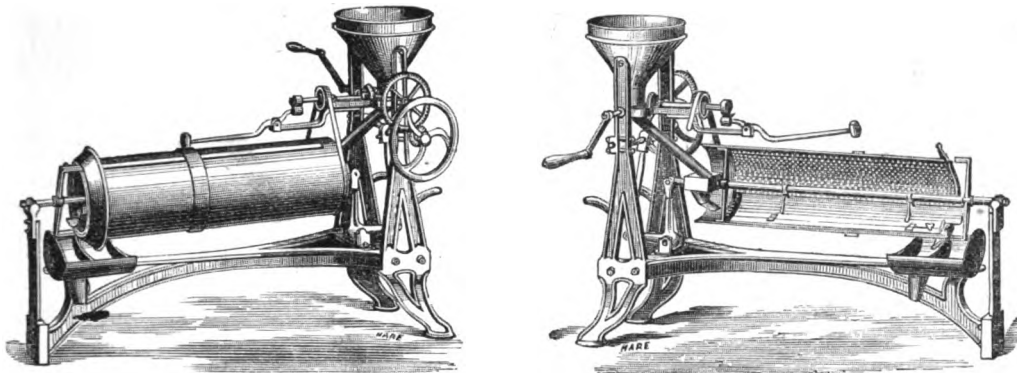
This is a very effective machine for cleaning wheat, which is subjected to a process of severe friction; first, by passing over a corrugated metal plate; next between two cylinders of rough wire, with beaters, and then passes through a powerful blast from the wind-fan attached. It occupies but little space, and is complete in itself—will clean from 5 to 6 qrs. per hour, when driven at 650 revolutions per minute.

WM. R. DELL AND SON,
MILLSTONE BUILDERS AND GENERAL MILL FURNISHERS, 26, MARK LANE,
LONDON.

THE "DUPLEX" GRAIN SORTER,

ADAPTED FOR THE SEPARATION OF ROUND FROM LONG SEEDS.

All Millers who have adopted these Machines report generally that they find them indispensable.



All ordinary Separators are useless  for the special purpose for which this Machine is adapted.

The "DUPLEX" Grain Sorter effects in the most simple manner the separation of round from long seeds; its construction is distinct, and, unlike any ordinary machine for this purpose, is not likely to get out of order; is durable and inexpensive. It consists of a metal Cylinder (see sketch) which has a rotatory and longitudinal motion; the concave of the Cylinder is pierced with semi-spherical holes or cavities; a stationary shoot extends the whole length of, and inside the Cylinder.

The wheat or grain enters the Cylinder and passes over the honeycomb surface, or round cavities, which latter, from their form and oblique position, take up the round seeds only, which remain until the Cylinder has rotated sufficiently high to cause them to fall from the cavities by their own gravity into the stationary shoot, down which they pass into the round seed spout; the wheat and similar grain from its elongated form passes over the round cavities, and being thus freed from the round seeds is delivered into a separate spout.

This apparatus is invaluable to Millers, &c., who know the necessity of good machinery to separate from grain, smut balls, garlic, cliver, tares, peppercorn or blighted kernels, cockle, and other leguminous or oleaginous seeds, which discolour the flour and are nauseous to the taste.

To the Merchant or Farmer it is most useful, as the wheat should be well separated either for sale or for sowing.

Machines adapted for separating oats from wheat are also manufactured; the honeycombed surface or holes being of larger diameter to allow the wheat to fall into them, while the oats being of lengthened form pass over them, and are perfectly separated. The power required is nominal, the largest size not requiring one-horse power.

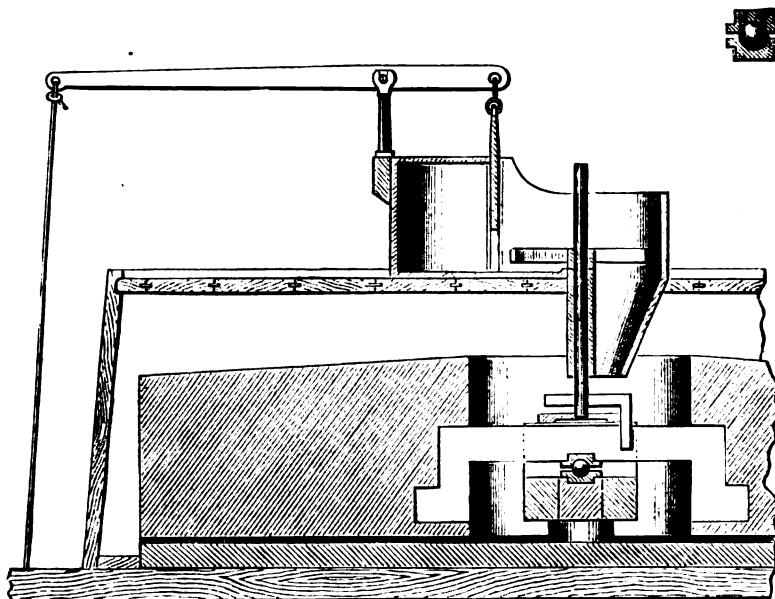
	Sizes adapted for Farmers, &c.			Sizes for Mills from 2 to 5 Pairs of Millstones.		For larger Mills.
	No. 1.	No. 2.	No. 3. With Sieve.	No. 4. With Sieve.	No. 5. No Sieve.	No. 6. 2 Cylinders. No Sieves.
Height of Machine	4 ft. 3 in.	4 ft. 5 in.	4 ft. 5 in.	5 ft.	5 ft. 7 in.	7 ft. 3 in.
Width	1 " 2 "	1 " 4 "	1 " 4 "	1 ft. 6 in.	2 ft.	4 ft.
Length	4 " 3 "	5 " 7 "	4 " 9 "	6 " 3 "	7 ft. 10 in.	7 ft. 10 in.
Weight	2 cwt.	2½ cwt.	3 cwt.	5 cwt.	7½ cwt.	One ton.
Capacity per 12 hours in bushels	45	80	90	130	195	390
Diameter of Pulley	hand	hand	15 in.	14½ in.	18½ in.	19½ in.
No. of Revolutions per minute	..	..	50	60 to 62	68 to 70	78 to 80
Prices, packed	£8 8 0	£12 12 0	£16 10 0	£25 10 0	£39 10 0	£63 0 0
With hammer, £1 extra.						

All Machines delivered F.O.B. or to any Railway Station in London.

Further particulars on application.

WM. R. DELL AND SON,
MILLSTONE BUILDERS AND GENERAL MILL FURNISHERS, 26, MARK LANE,
LONDON.

BAKER'S PATENT FEEDER FOR MILLSTONES.



This figure represents the section of a Millstone and Millstone Case, fitted with Baker's Patent Feeder for Millstones. This feeder works on a principle which ensures a feed exactly proportioned to the speed at which the stones are running. The feed is adjusted by the very simple regulating slide shown, so as to pass a certain quantity of wheat per revolution, so that the stones begin grinding at their first revolution, and continue to do so as long as they turn round, always in proportion to the speed. This obviates the necessity for the constant attention at stopping and starting, necessary under the old system. Price £4 per set, ready to fix.

BAKER'S PATENT CUPS & BALLS.

The Cups and Balls afford the most delicate Balance for Millstones which could be desired, with the great advantage of being renewable in a few minutes when worn out, without removal of either the spindle or centre-bar.

The Balls work in oil, and, being tempered to extreme hardness, years of work may be expected with no perceptible difference as to wear. They are not liable to be broken like the ordinary cock-head. In every case their use has kept the stones on a much better Floor or Face. On examination after six years' use no wear is apparent on the Balls. Price £2 per set, ready for use.

Best Cast-steel Mill Chisels and Picks, warranted.
 Flour Dressing Machines of every description, fitted with wire silk.
 Smut Machines, Wheat Screens, and Separators.
 Flour Machines, Brushes, Mill Brooms, Hand and Rib Brushes.
 Machine Wire of superior quality and texture, warranted to dress free.
 Improved square bar Smut Wire, woven by power extra width and strength.
 Strong Wove Wire for Kiln Floors, made any size.
 Punched Iron and Perforated Zinc.
 Best tested Hoisting Chains.
 Metal Provers and Mahogany Staffs.
 Screw Lifting Jacks, Weston's Patent Differential and other Blocks.
 Leather Driving Bands, best quality, well stretched.

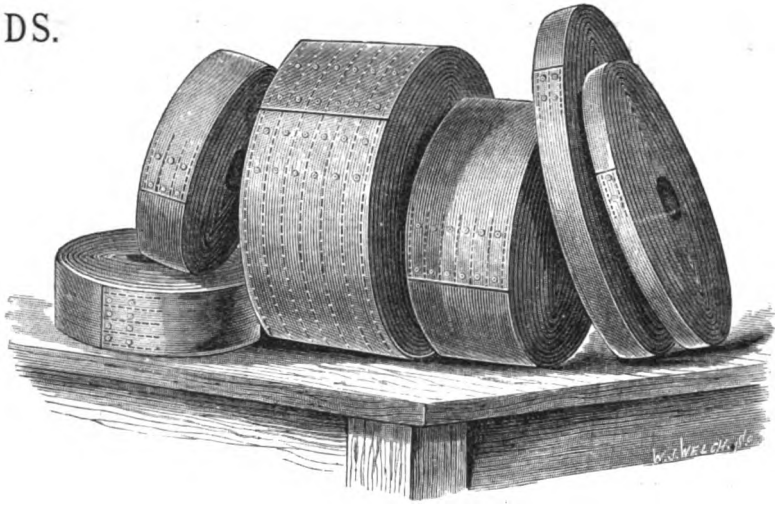
Catgut Bands for Grooved Riggers with Cast-steel Hooks and Eyes.
 Vulcanized Indiarubber and Guttapercha Bands.
 Elevator Webbing and Buckets, Scrap Screws, and Copper Rivets.
 Improved Wrought-iron Worm Creepers, complete, for Corn and Meal.
 Macintosh Cart and Wagon Covers, Tarpaulins, Sacks, and Bran Bags.
 Superior Swiss and French Silk for Dressing Flour.
 Sack Barrows, Warehouse Trucks, Bill Thrifts.
 Corn Measures, Scales, Weighing Machines and Weights, Sieves.
 Improved Patent Bolting Cloths and Reels complete.
 And all other Implements used in Corn, Flour, and Rice Mills.

WM. R. DELL AND SON,

MILLSTONE BUILDERS AND GENERAL MILL FURNISHERS, 26, MARK LANE,
 LONDON.

MILL BANDS.

WM. R. DELL AND SON make MILL BANDS a speciality, and have for many years supplied some of the principal houses, both at home and abroad, with their Belting. They guarantee the wear of their first-quality Belting.



LIST OF PRICES.

SINGLE.					DOUBLE.				
Per Foot.					Per Foot.				
1 inch	..	..	—	to	os. 4½d.	3 inch	..	..	2s. 6d. to 2s. 10d.
1½	..	..	os. 6d.	..	os. 7d.	3½	..	..	3s. 0d. „ 3s. 4d.
2	..	..	os. 8d.	..	os. 9d.	4	..	..	3s. 5d. „ 3s. 10d.
2½	..	..	os. 11d.	..	1s. 1d.	4½	..	..	3s. 10d. „ 4s. 4d.
3	..	..	1s. 2d.	..	1s. 4d.	5	..	..	4s. 4d. „ 4s. 8d.
4	..	..	1s. 9d.	..	1s. 11d.	6	..	..	5s. 2d. „ 5s. 7d.
5	..	..	2s. 2d.	..	2s. 5d.	7	..	..	6s. 2d. „ 6s. 9d.
6	..	..	2s. 8d.	..	3s. 0d.	8	..	..	7s. 6d. „ 8s. 0d.
7	..	..	3s. 3d.	..	3s. 7d.	9	..	..	8s. 8d. „ 9s. 2d.
8	..	..	3s. 10d.	..	4s. 3d.	10	..	..	9s. 9d. „ 10s. 4d.
9	..	..	4s. 5d.	..	4s. 10d.	11	..	..	11s. 0d. „ 11s. 6d.
10	..	..	5s. 0d.	..	5s. 5d.	12	..	..	12s. 0d. „ 12s. 8d.

W. R. DELL AND SON are large Importers of the BEST SWISS AND FRENCH SILKS for Dressing Flour and Separating Rubbles.

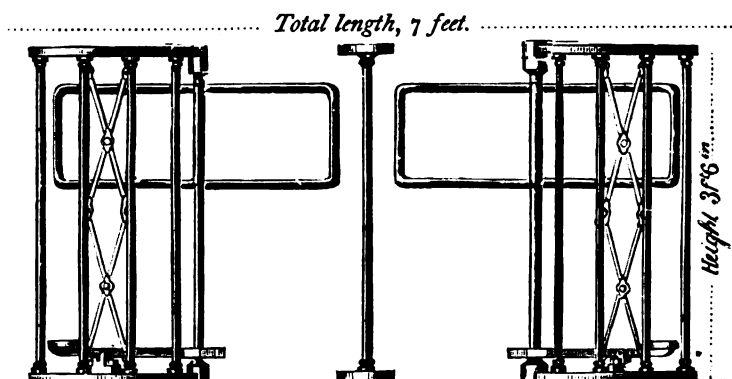
LIST OF PRICES.

SWISS, 39½ inch.			FRENCH, 21 inch.			FRENCH, 23 inch.		
No.	Price per yard.		No.	Price per yard.		No.	Price per yard.	
000	 5s. 0d.		6			80	 4s. 3d.	
00	 5s. 3d.		10			90	 4s. 6d.	
0	 5s. 9d.		12		 3s. 6d.	100	 4s. 9d.	
1	 6s. 6d.		14			105	 4s. 9d.	
2	 7s. 6d.		16			110	 5s. 0d.	
3	 8s. 6d.		18			115	 5s. 3d.	
4	 9s. 6d.		20			120	 5s. 6d.	
5	 10s. 6d.		24		 3s. 9d.	125	 5s. 9d.	
6	 11s. 9d.		28			130	 6s. 0d.	
7	 12s. 9d.		32			135	 6s. 6d.	
8	 13s. 9d.		36			140	 6s. 9d.	
9	 14s. 3d.					150	 6s. 6d.	
10	 15s. 6d.					160	 7s. 0d.	
11	 16s. 6d.					170	 7s. 3d.	
12	 17s. 6d.					180	 7s. 6d.	
13	 18s. 6d.							
14	 19s. 6d.							
15	 20s. 6d.							
16	 21s. 6d.							

AGENTS FOR BLACKMORE'S PATENT BOLTING CLOTHS.

WM. R. DELL AND SON,
MILLSTONE BUILDERS AND GENERAL MILL FURNISHERS, 26, MARK LANE,
LONDON.

NORTON'S PATENT IMPROVED REGISTERING TURNSTILES.



Applicable to Toll Bridges, Theatres, Public Gardens, Steamboat Piers, Factories where large numbers of men are employed, Racecourse Enclosures, Cricket Grounds, and Exhibitions of all kinds where money is taken on admission, or where it is desired to ascertain the numbers entering.

Independent of their value as a security against fraud, it is found that the adoption of these Instruments is a matter of positive economy, as it permits the employment of a less expensive class of money-takers, and when re-admission by pass tickets is not allowed, saves the whole expense of check-takers.

Eight of the Patent Instruments were in use during the whole of the first Dublin Exhibition, and twelve at the last one, without the least derangement, or a single error occurring: and forty-two are in constant use at the Crystal Palace, with a like result.

They have been adopted in India and other Cotton and Rice-growing countries, for counting the labourers as they pass through with "bales," &c., securing great accuracy.

NOTE.—The above Engraving shows two of these Turnstiles with a Division, or Middle Rail separating them—a plan frequently adopted in their use.

PRICES:

	£	s.	d.
Registering Turnstile	20	0	0
Non-Registering Turnstile	18	0	0
Middle Rail (if with Brass Arms, 12s. extra)	2	10	0

LE GRAND AND SUTCLIFF,

ARTESIAN WELL BORERS,

AND

PROPRIETORS OF NORTON'S PATENT "ABYSSINIAN" TUBE WELLS LETTERS PATENT,
MAGDALA WORKS, 100, BUNHILL ROW, LONDON, E.C.

"ABYSSINIAN" TUBE WELLS.

NORTON'S PATENT.

Without the need of any reservoir, these Wells, by the simple action of the pump, *draw their supply to them*; hence it has been incontestably proved that they will yield more than dug wells.

Where very large supplies of water are required they are obtained by driving two or more Wells at certain distances apart and joining them to one horizontal main, to which steam, or any other kind of pump, can be applied. On this plan, supplies, varying from 1000 to 40,000 gallons per hour, are now in daily use at Water Works, Breweries, Factories, Infirmaries, Railway Stations, &c.

Every description of pump, for either raising or forcing, hitherto employed with dug wells, or other sources of supply, can be used for the precisely similar purposes in connection with Norton's Patent Abyssinian Tube Wells.

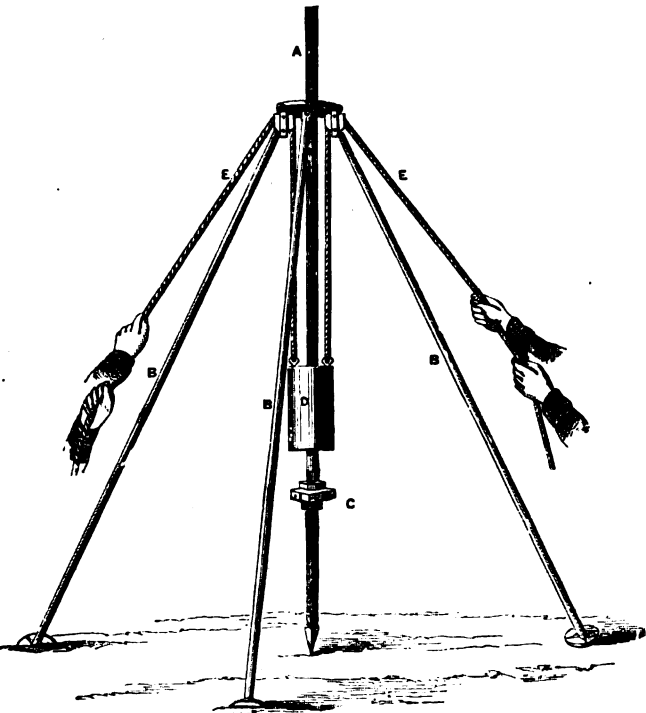
Unlike dug wells, instead of collecting all surface drainage that can find its way into them, these Wells shut out all top percolation, and draw their supply direct from the bottom of the water-bearing seam, thereby ensuring the purest and most permanent supply possible to be obtained.

This isolation of objectionable seams can only be very imperfectly achieved under the old system, and then by a great outlay.

By this process Wells can be made in shifting sands (if there be a perceptible grit) by means of Filter Tubes, a feat which is next to an impossibility by any other known plan.

In addition to the ordinary "Abyssinian" Tube Well, which is suitable for all soils that are penetrable by percussion (for depths varying from 15 to 100 feet) without removing any earth, such as gravel, sand, chalk and flints, loam, soft clays, and all loose strata, there is the combined bored and driven "Abyssinian" Tube Well, which can be made to *any depth* and through *any strata*.

Some idea may be formed of the extent to which these Wells are employed when it is mentioned that Messrs. Allsopp, Bass, and other breweries in Burton-on-Trent alone are furnished with supplies on this system amounting to over *two million gallons per day of ten hours*.



PRICES:

1½ in. 30 ft. WELL AND PUMP, £10; 2 in. 30 ft. WELL AND PUMP, £16; 3 in. 30 ft. WELL, £22 15s.

For Greater or Less Depths Quotations will be given on Application.

Men's Time and Expenses, Railway Fares, and Carriage of Materials to and fro, in all operations, Extra.

EXPORT.—Large quantities of these Wells are annually exported to all parts of the world, and full Printed and Illustrated Directions for Driving are furnished with them. Special Quotations for Wells and Driving Apparatus for Abroad furnished on application.

LE GRAND AND SUTCLIFF,

ARTESIAN WELL BORERS,

AND

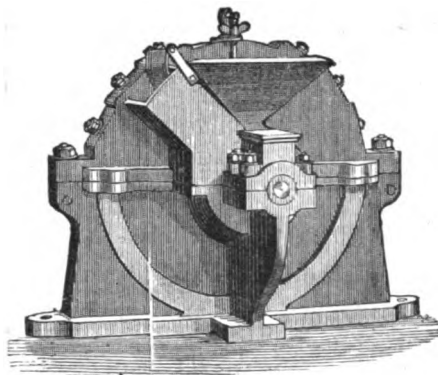
PROPRIETORS OF NORTON'S PATENT "ABYSSINIAN" TUBE WELLS LETTERS PATENT

(Contractors to H.M. War Department, the Crown Agents for the Colonies, &c.),

MAGDALA WORKS, 100, BUNHILL ROW, LONDON, E.C.

GRINDING AND DISINTEGRATING MILL.

NORTON AND HAWKSLEY'S PATENT.



This Mill unquestionably supersedes all others hitherto introduced for the purpose of GRINDING and CRUSHING, as it accomplishes its work with rapidity and perfection, and is so universal in its adaptation that there are few substances (no matter how hard) which cannot be reduced more rapidly, more perfectly, and with less cost and wear and tear, than by any other known process.

Of the numerous advantages possessed by the Machine, one of the most important is its great durability under very severe tests; the cost by wear and tear being nominal even in reducing so hard a substance as coprolites: this important feature has been obtained by making provision for the reversing and changing of the parts most subjected to wear, and for renewing them entirely (when worn out) at a mere nominal cost. It will therefore be seen that every provision is made for ensuring a continuation of uniform and regular work (a desideratum never before obtained), such as enables the Patentees to challenge all competition.

Amongst the numerous substances it is capable of grinding will be found the following, viz.: Bones, Coprolites, Quartz, Shale, Coal, Coke, Rock or other Asphalte, Charcoal, Gypsum, Oyster Shells, Myrobalans, Nuts, Bark of every description, Acorns, Locust Beans, Linseed, Linseed Cake, Oat-husks, Wheaten Chaff, Mustard, Pepper, Dry Colours, Cork, Logwood, and all kinds of Dye Woods; Maize, Beans, Peas, Tares, Lentils, Barley, Oats, and grain of any description can be ground much quicker, and at far less cost, than by ordinary millstones. Gorse, Hay, Straw, Bean and Pea Haulms, and all similar substances can be fed into the machine without being cut up by any previous process.

PRICES:

	£	s.	d.
Small Mill.. .. .	25	0	0
Large Mill	70	0	0

LE GRAND AND SUTCLIFF,

ARTESIAN WELL BORERS,

AND

PROPRIETORS OF NORTON'S PATENT "ABYSSINIAN" TUBE WELLS LETTERS PATENT,
MAGDALA WORKS, 100, BUNHILL ROW, LONDON, E.C.

WAREHOUSE LIFT.

The figure shows a Hand Lift on the most approved principle, being self-contained and having four corner iron uprights or guides for the Cage to work between. The Cage is suspended by a rope or chain passing over a pulley at the top, having a counter-balance weight at the other end and connected to the hauling wheel by gearing, and the load raised by means of an endless rope passing through all the floors.

ENTABLATURE.—The Entablature at top and bottom is of Cast Iron.

CAGE.—The Cage is made with Angle-Iron top and bottom, Wood Platform, Gun-Metal Rollers and Guides.

GEARING.—The Gearing is well fitted, and more or less powerful according to the load to be raised, with Wrought-Iron Shafts, large Hauling Wheels, Brake Lever and Weight, best Ropes, heavy Balance-weight complete.

R. W. & Co. have fixed a large number in London and the country, but cannot here describe each kind fully, there being so much difference in construction; but copies of one or two testimonials from people who have both used and approved them are given below, where they can be daily seen in operation.

In London, more especially, this great accessory to labour is being felt and appreciated by all who use it; and in fact, a modern warehouse without it is the exception.

29, St. John's Lane, Clerkenwell, E.C.

Having had the Lift (which you erected for us) in use for some months, we have much pleasure in testifying to the substantial manner in which the work has been done, and the excellency of the arrangements of the working parts, which ensures an ease of working that has surpassed our expectations.

Yours faithfully, R. FENNER & Co.

8, Cloak Lane, Cannon Street, E.C.

With reference to your inquiry as to the working of the Lift, supplied by you two or three years ago, I beg to state that it has since been in daily use, and has given great satisfaction.

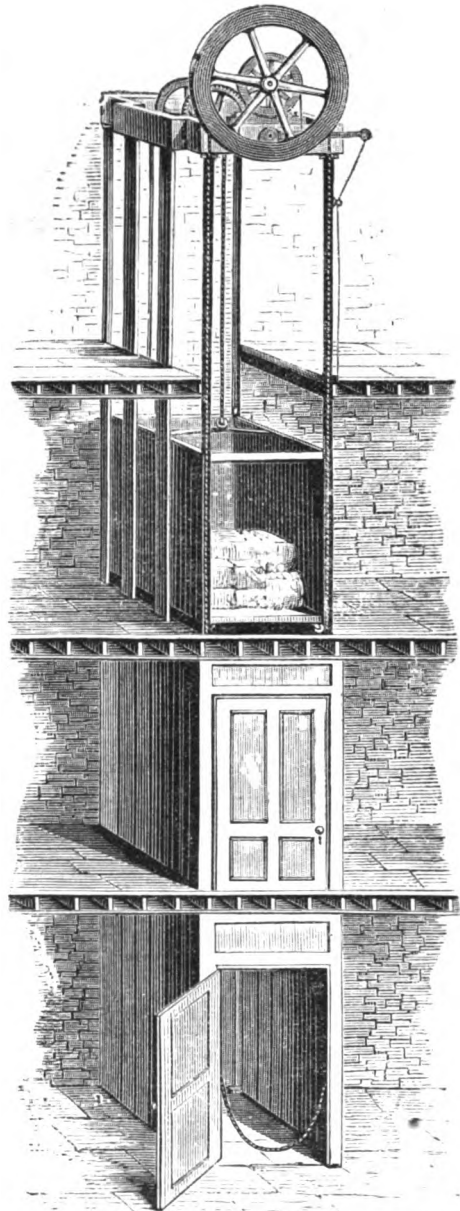
I remain, yours truly, T. F. NEWELL.

British & Foreign Bible Society, Queen Victoria Street, E.C.

I have much pleasure in stating that the four Lifts you made for the Bible Society, about six years ago, are working most satisfactorily, and are of immense service to us in saving manual labour. Should any of your customers wish to see them, I shall be most happy to show them; they are now in constant work.

Yours truly, J. FRANKLIN, *Depository.*

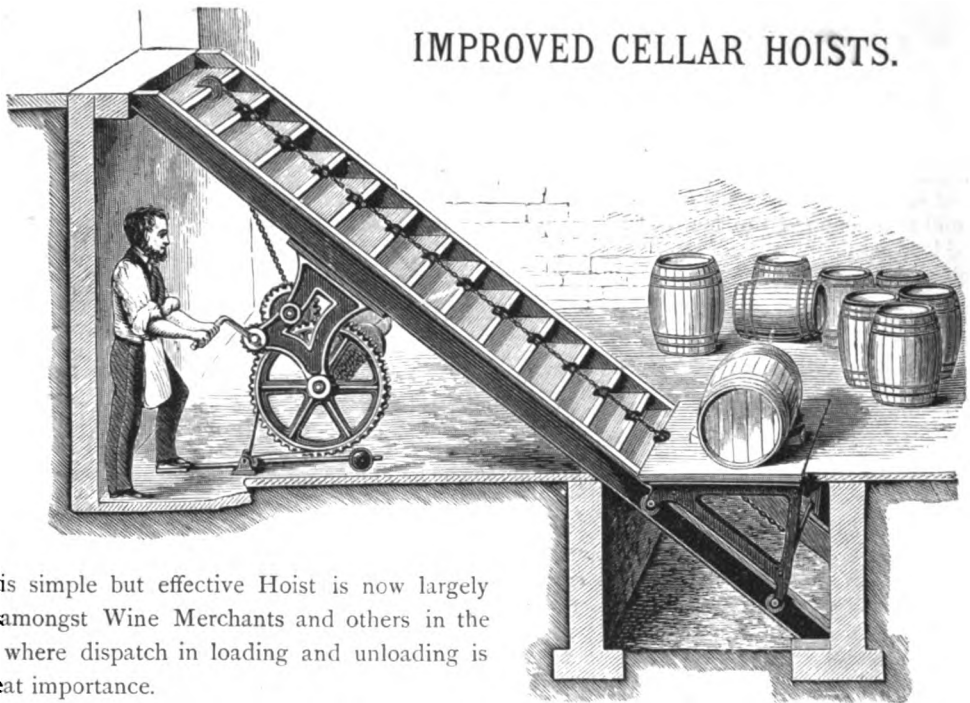
N.B.—Estimates furnished for Hand, Steam, and Hydraulic Lifts, on receipt of weight required to be raised, size of cage, and height of floors through which it has to pass, with or without fixing.



FOR IRON DOORS, CELLAR HOISTS, &C., SEE NEXT PAGE.

R. WAYGOOD AND CO.,
NEWINGTON IRON-WORKS, FALMOUTH ROAD, LONDON, S.E.

L.

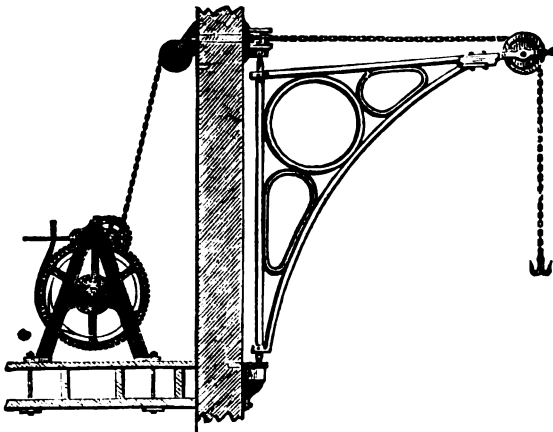


This simple but effective Hoist is now largely used amongst Wine Merchants and others in the City, where dispatch in loading and unloading is of great importance.

Names of two places in London are given below, where they are daily in work ; but many others can be given, if required, and shown in operation.

MESSRS. J. AND W. NIMMO, Red Lion Court, Cannon Street, E.C. ; MESSRS. ROSENHEIM AND SONS, Union Court, New Broad Street, E.C.

WAREHOUSE JIBS.



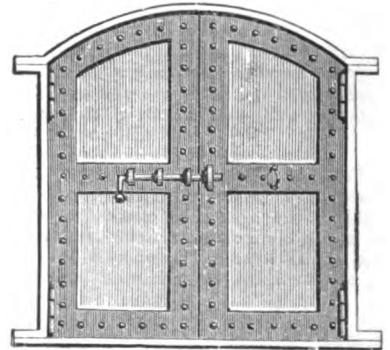
R. WAYGOOD AND Co. have made and fixed a large number of Jibs with Cranes and Crabs, and will be happy to estimate for work of this class, including fixing complete.

PRICES OF JIBS.

Radius.	$\frac{1}{4}$ Ton.	1 Ton.	2 Tons.
3 feet.	£6.	£7 10s.	£9.

For larger sizes add one-third to above Prices for each extra foot in radius.

IRON DOORS FOR WAREHOUSES, FOR FIRE-PROOF ROOMS AND PARTY WALLS.

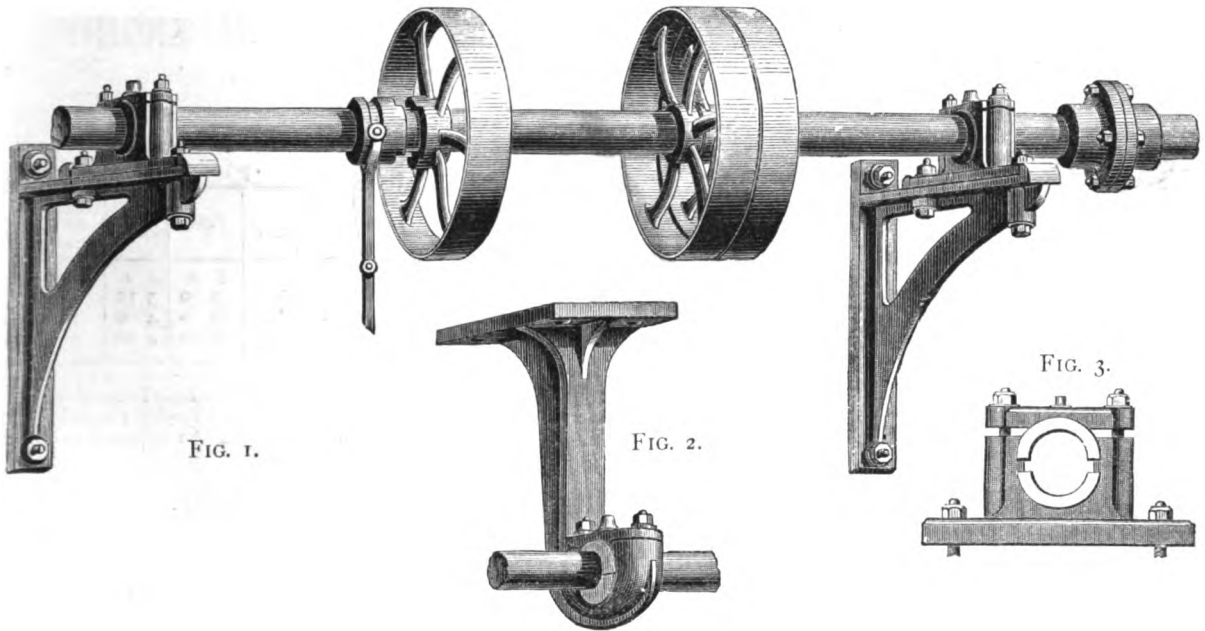


The increasing use of these Doors has induced R. W. and Co. to prepare special machinery for making them, which they are now in a position to do at country prices and of first-class workmanship, either to hinge or slide.

Strong Room Doors made to order.

R. WAYGOOD AND CO.,
NEWINGTON IRON-WORKS, FALMOUTH ROAD, LONDON, S.E.

SHAFTING AND PULLEYS.



The above woodcuts represent some of R. W. & Co.'s standard patterns of Brackets, Plummer Blocks, &c., though they have a large stock of different shapes and sizes.

SHAFTING.

R. W. & Co. make their shafting from "I.B." Bagnals Iron: this brand being the best suited for the purpose, and though higher in price, they are prepared to supply Shafting from this iron at the same prices as most makers using a commoner quality, thus giving their friends a better article at the same price. All Shafting turned to gauge and supplied on the shortest notice.

PULLEYS.

Pulleys supplied of any diameter and width on face. Prices vary according to size.
A large assortment of Split Pulley, Spur, Bevel and Mitre Wheel patterns in stock.

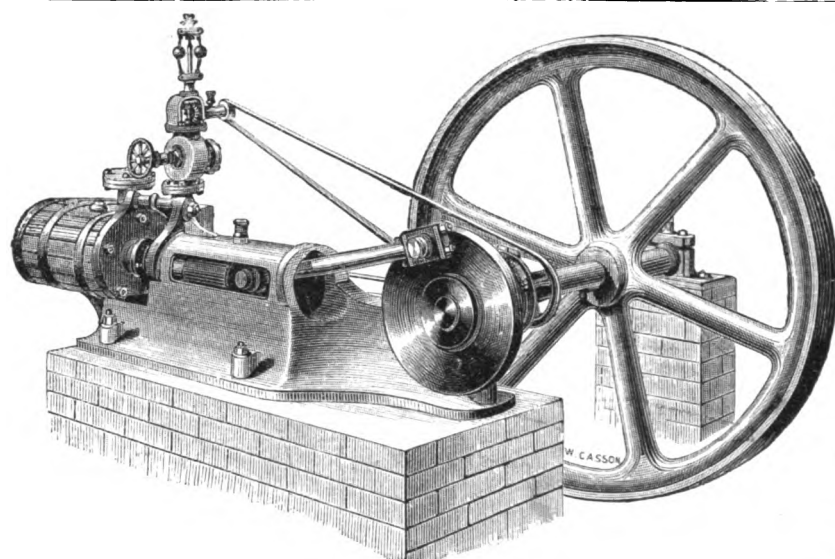
PRICES OF BRIGHT-TURNED SHAFTING AND PLUMMER BLOCKS, &c.

Diameters	1 1/4 in.	1 1/2 in.	2 in.	2 1/4 in.	2 1/2 in.	2 3/4 in.	3 in.	3 1/4 in.	3 1/2 in.	4 in.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Bright Wrought-Iron Shafting Turned to Standard Gauge per foot	2 8	2 9	3 9	4 9	5 6	6 10	8 2	11 3	12 6	15 0
Plummer Blocks, fitted with Top & Bottom Brasses, Bolts and Nuts complete	11 6	13 0	18 6	24 0	30 0	36 0	42 0	47 6	55 0	65 0
Loose Collars, Bored, Turned, and Fitted with Set Screw	4 0	4 6	5 9	6 3	6 9	7 0	7 6	8 9	10 0	12 6
Bright-Turned Couplings, with Bright Bolts and Nuts, and Key-ways Cut	20 0	22 0	25 0	31 0	37 6	43 6	50 0	56 0	62 6	80 0

Odd and short lengths 10 per cent. advance on the above prices.

R. WAYGOOD AND CO.,
NEWINGTON IRON-WORKS, FALMOUTH ROAD, LONDON, S.E.

L 2



HORIZONTAL TRUNK PATTERN STEAM ENGINE.

Complete with High-speed Governors, Turned Fly-wheel, Cylinder lagged with Felt, Mahogany and Brass Bands.

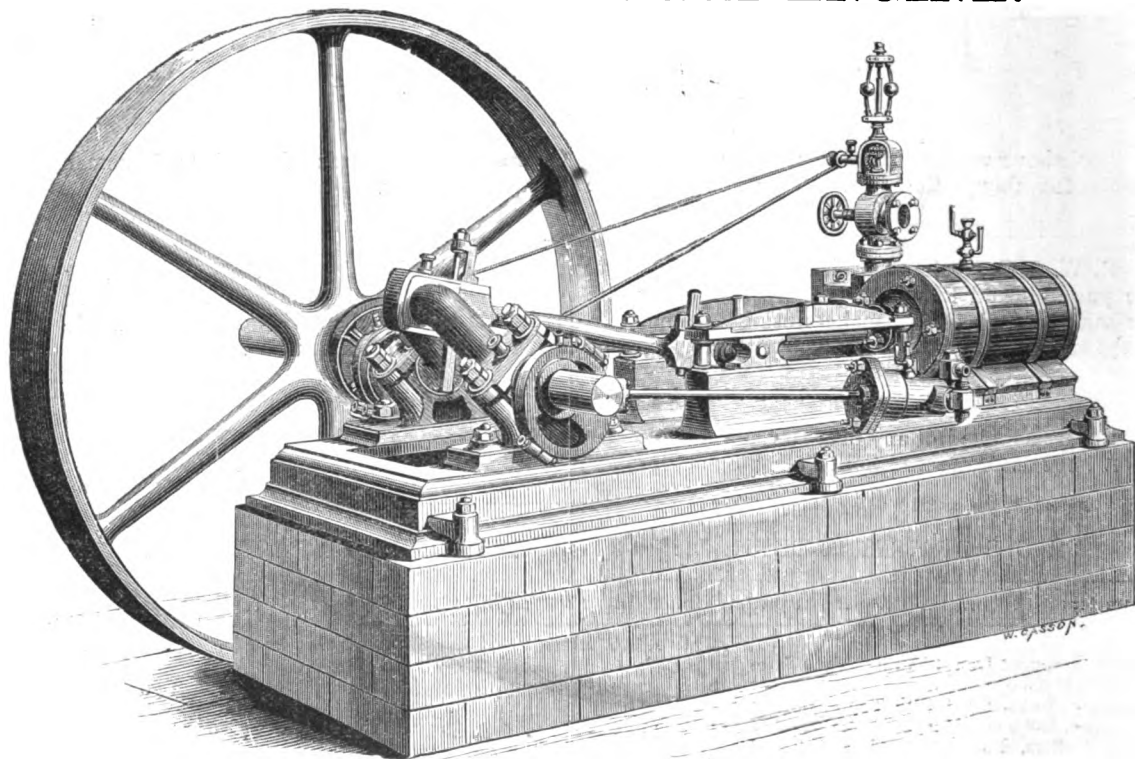
PRICES.

Horse Power.	Dia. of Cyl.	Price.		Feed Pump.	Cylinder lagged.
		£	s.	£	s.
3	5 in.	39	0	3	10
4	6 "	46	0	4	0
5	7 "	52	10	4	10

Packing for Shipment extra.

R. W. & Co. have Patterns of Horizontal and Vertical Engines, all sizes, from 2 horse-power and upwards.

HORIZONTAL STEAM ENGINE.



SIZES AND PRICES.

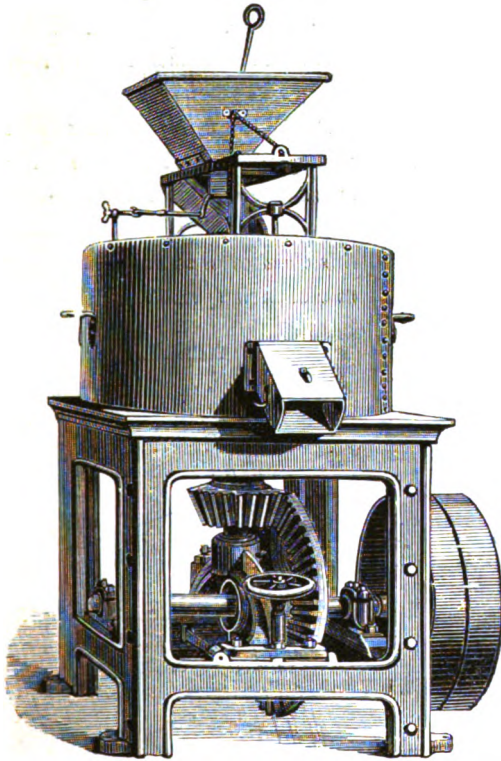
HORSE POWER OF ENGINE	2	4	6	8	10	12	14	16	20	25
Diameter of Cylinder	4½ in.	6½ in.	8½ in.	9½ in.	11 in.	12 in.	13 in.	14 in.	16 in.	18 in.
Length of Stroke	9 "	12 "	16 "	18 "	20 "	24 "	26 "	28 "	32 "	36 "
PRICE OF ENGINE complete	£40	£65	£87 10s.	£105	£155	£160	£190	£210	£260	£320
Expansion Valve Extra	£6 10s	£7 10s	£8	£10	£12	£14	£15	£15	£23	£25

R. WAYGOOD AND CO.,
NEWINGTON IRON-WORKS, FALMOUTH ROAD, LONDON, S.E.

RICE-CLEANING MACHINERY.

CONSISTS OF HUSKER, PEARLER, POLISHER, SCREENS, &c. Complete Sets of Machinery made up for any quantity required. R. W. & Co. have erected Rice Mills in different parts of the world.

THE IMPROVED RICE-HUSKING MILL. With Loose Pulley, 25s. to 60s. extra.

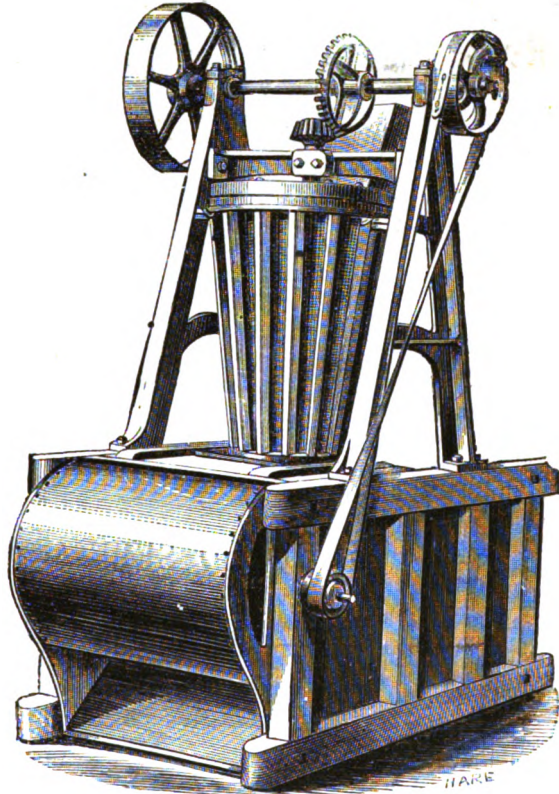


FOR HORSE, STEAM, OR OTHER POWER.

PRICES. SIZE OF STONES.

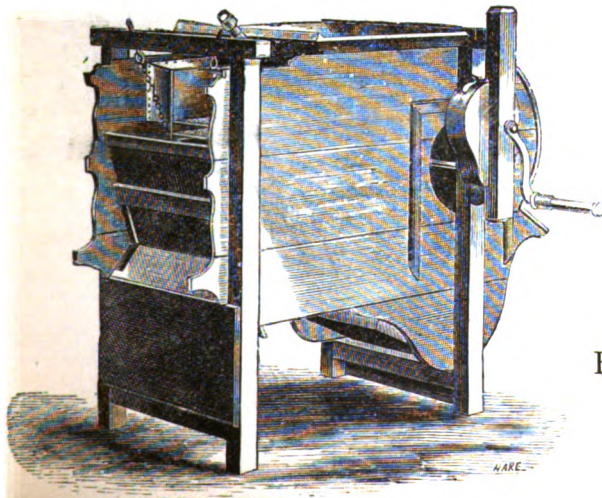
20 in. £22 10s.	24 in. £27 10s.	30 in. £40.
36 in. £52 10s.	42 in. £65.	48 in. £80.
		60 in. £115.

RICE POLISHER.



PRICES.

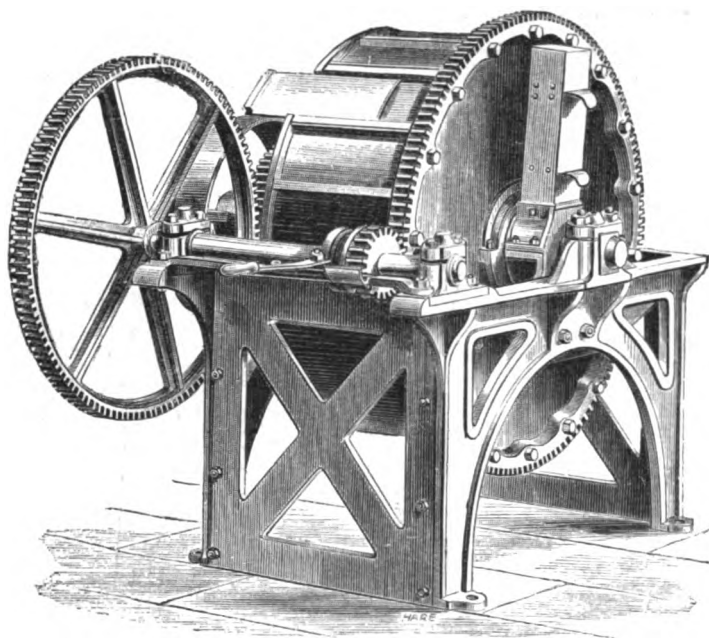
No. 0	£100 0 0
" 1	87 10 0
" 2	70 0 0
" 3	45 0 0



RICE WINNOWER.

PRICES ON APPLICATION.

R. WAYGOOD AND CO.,
NEWINGTON IRON-WORKS,
FALMOUTH ROAD, LONDON, S.E.



RICE PEARLER.

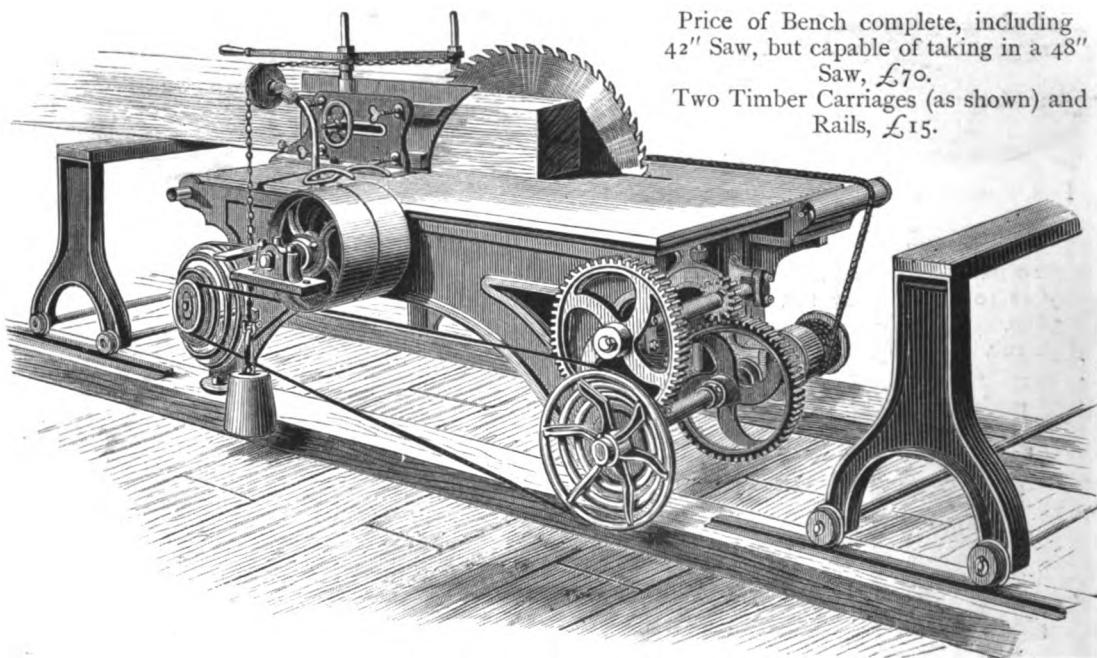
The accompanying sketch represents R. W. & Co.'s Machine for Pearling Barley and Rice, and is also used for Decorticating Wheat, previous to grinding. It is made in four sizes, Nos. 0, 1, 2, and 3.

R. W. & Co., having had considerable experience in the manufacture of Rice Machinery, beg to offer many advantages in this class of machinery, it being one of their specialities.

PRICES.

No. 0	.. ..	£100
„ 1	.. ..	£87 10s.
„ 2	.. ..	£70
„ 3	.. ..	£45

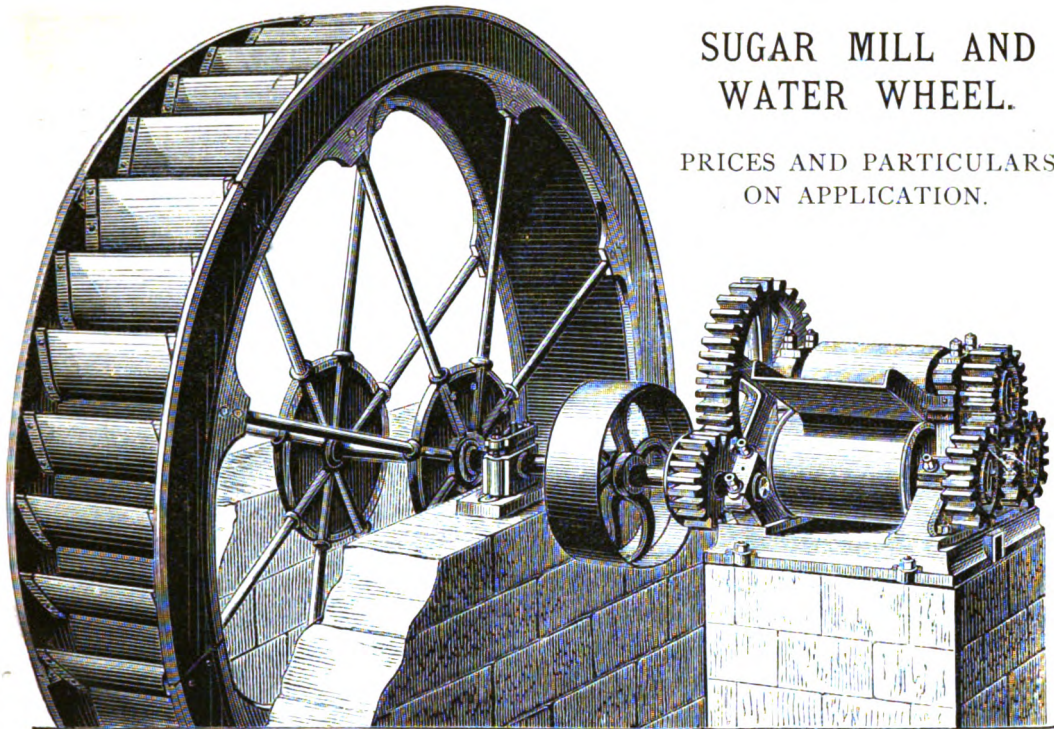
IMPROVED SELF-ACTING SAW BENCH.



Price of Bench complete, including 42" Saw, but capable of taking in a 48" Saw, £70.
Two Timber Carriages (as shown) and Rails, £15.

R. WAYGOOD AND CO.,

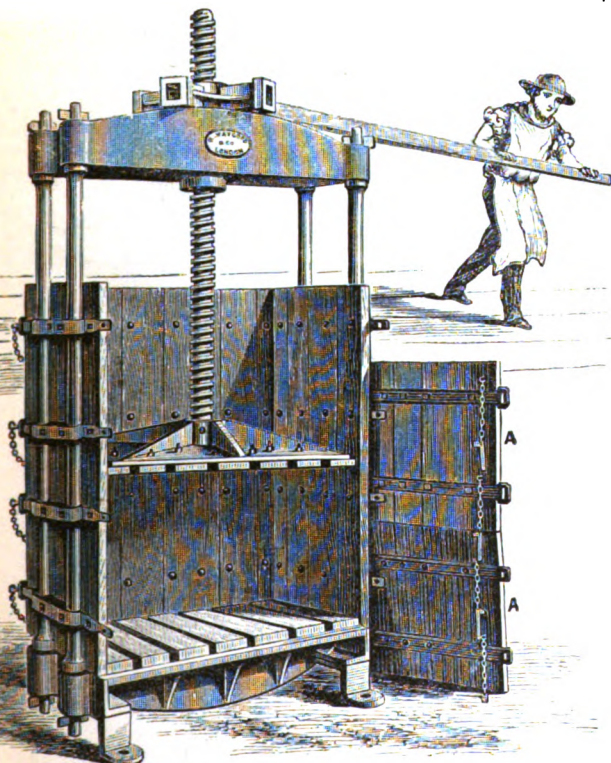
NEWINGTON IRON-WORKS, FALMOUTH ROAD, LONDON, S.E.



SUGAR MILL AND WATER WHEEL.

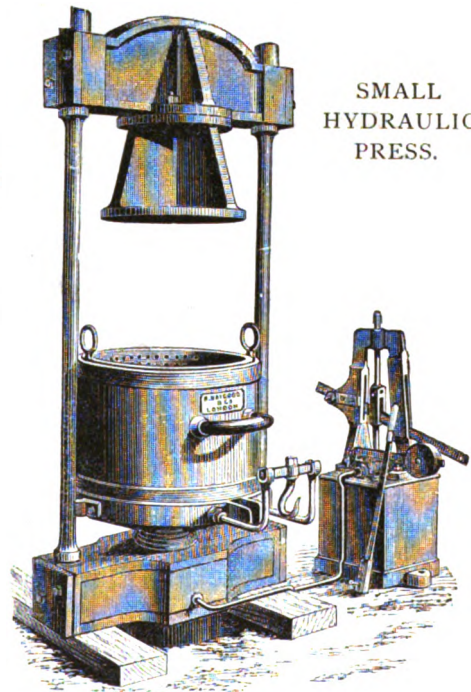
PRICES AND PARTICULARS
ON APPLICATION.

They will be happy to furnish estimates for Single Mills or complete Plants of Machinery, having Patterns for most sizes of Mills. For full particulars of Sugar Machinery, see R. W. and Co.'s Catalogue, Section 1.



HAND-POWER SCREW PRESS.

For Wool, Cotton, Hay, and Fibrous Substances.



SMALL
HYDRAULIC
PRESS.

Hydraulic Presses made for any class of Pressing. See R. W. and Co.'s Illustrated Catalogue, Section 2.

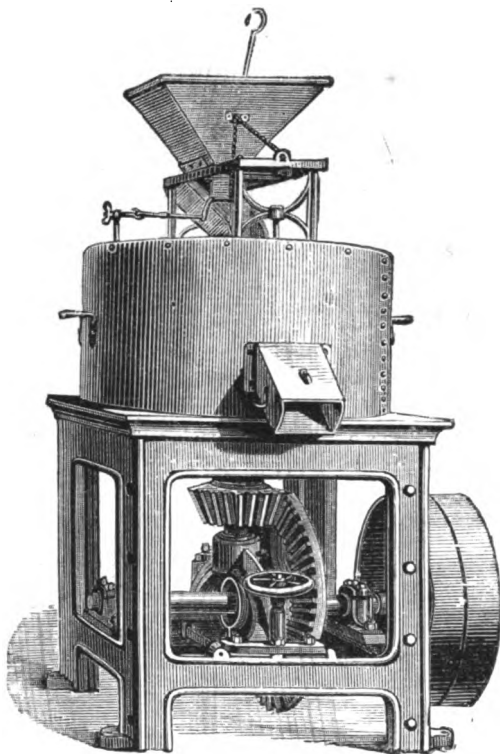
R. WAYGOOD AND CO.,
NEWINGTON IRON-WORKS, FALMOUTH ROAD, LONDON, S.E.

FLOUR MACHINERY.

FOR COMPLETE SETS OF FLOUR MACHINERY AND FULL DESCRIPTION, SEE R. WAYGOOD & Co.'s
ILLUSTRATED CATALOGUE, SECTION 3.

THE IMPROVED FLOUR MILL.

If with Loose Pulley, 25s. to 60s. extra.



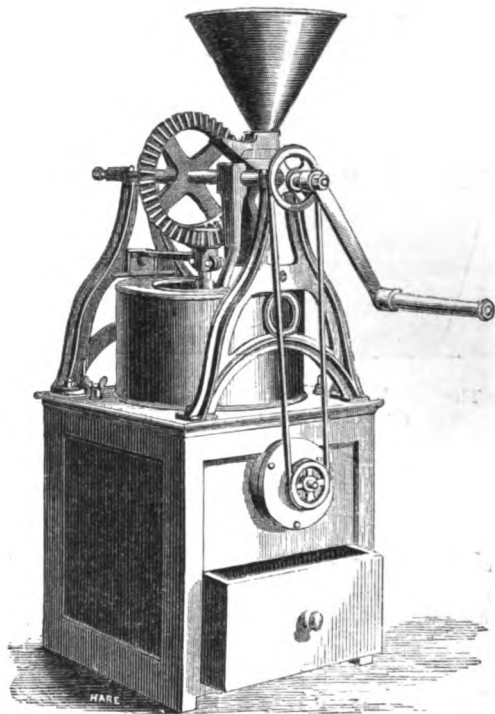
FOR HORSE, STEAM, OR OTHER POWER, WITH
FRENCH BURR STONES.

PRICES.

SIZE OF STONES.

20 in.	24 in.	30 in.	36 in.
£25	£35	£52 10s.	£65
	42 in.	48 in.	
	£82	£100	

HAND-POWER CORN MILL.



PRICE.

WITH FRENCH STONES ON IRON FRAMES.

14 in.	16 in.	18 in.	20 in.
£16	£18	£20	£22

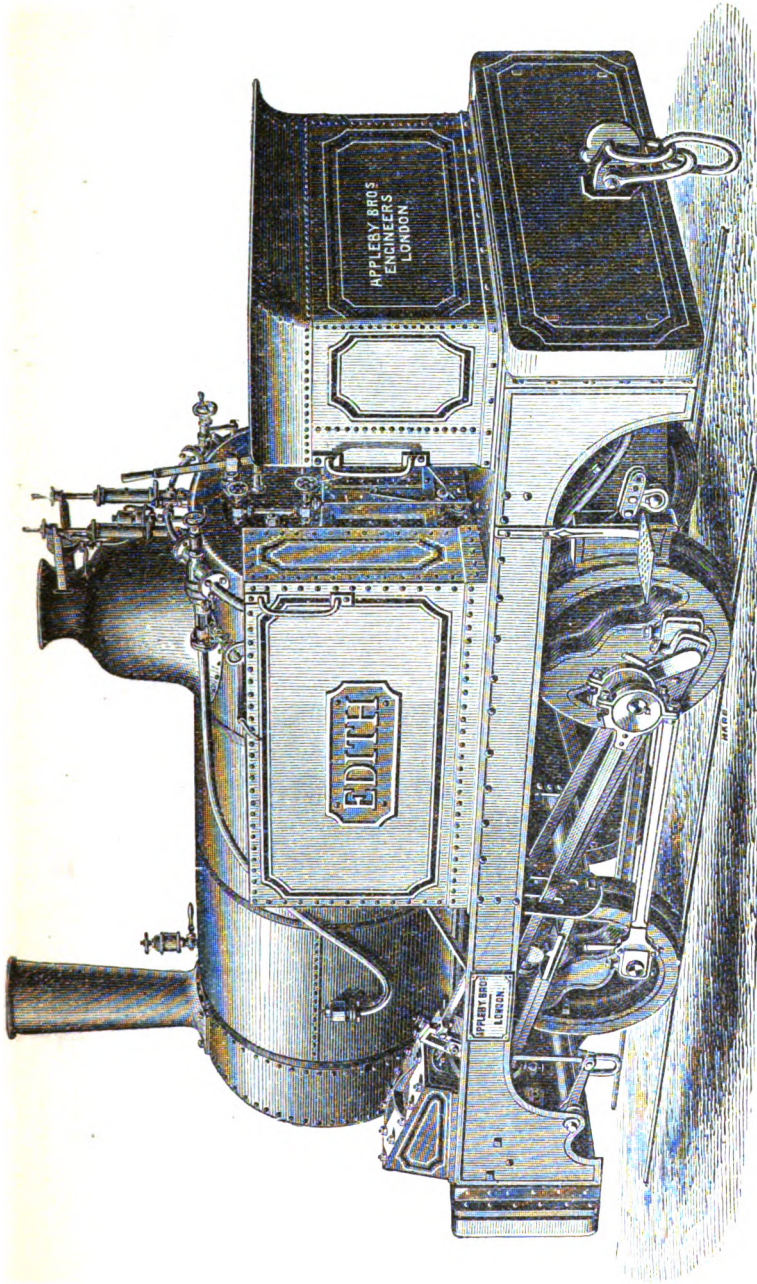
If without dresser, 21s. less.

STEEL MILLS, PRICE FROM £5 10s. to £30.

R. WAYGOOD AND CO.,
NEWINGTON IRON-WORKS, FALMOUTH ROAD, LONDON, S.E.

LIGHT LOCOMOTIVES,

FOR CONTRACTORS, OR FOR PASSENGER, GOODS, OR MINERAL TRAFFIC.*



The Engine illustrated has outside Cylinders 8 in. diameter with 15 in. stroke, placed at an angle of 1 in 5, and it is carried on two pairs of coupled wheels, 2 ft. 3 in. in diameter, with cast-steel tyres, and 5 ft. centre to centre; this short wheel base is adopted to enable the Engine to traverse freely the sharp curves met with on the line. The Boiler has a copper fire-box, and is fitted with 72 brass tubes; the total heating surface being 141 square feet; and the grate area 5.13 square feet. The Springs are placed between the inside and outside frames; the gauge is 2 ft. 8 in., but the same general design is carried out for any gauge up to 4 ft. 8½ in., and the style of finish throughout is that of the best class of locomotive work.

Prices, with full specification of this and various other sizes, may be had on application.

• *Vide* 'Engineering,' Vol. II., No. 264. January 20th, 1871.

APPLEBY BROTHERS,

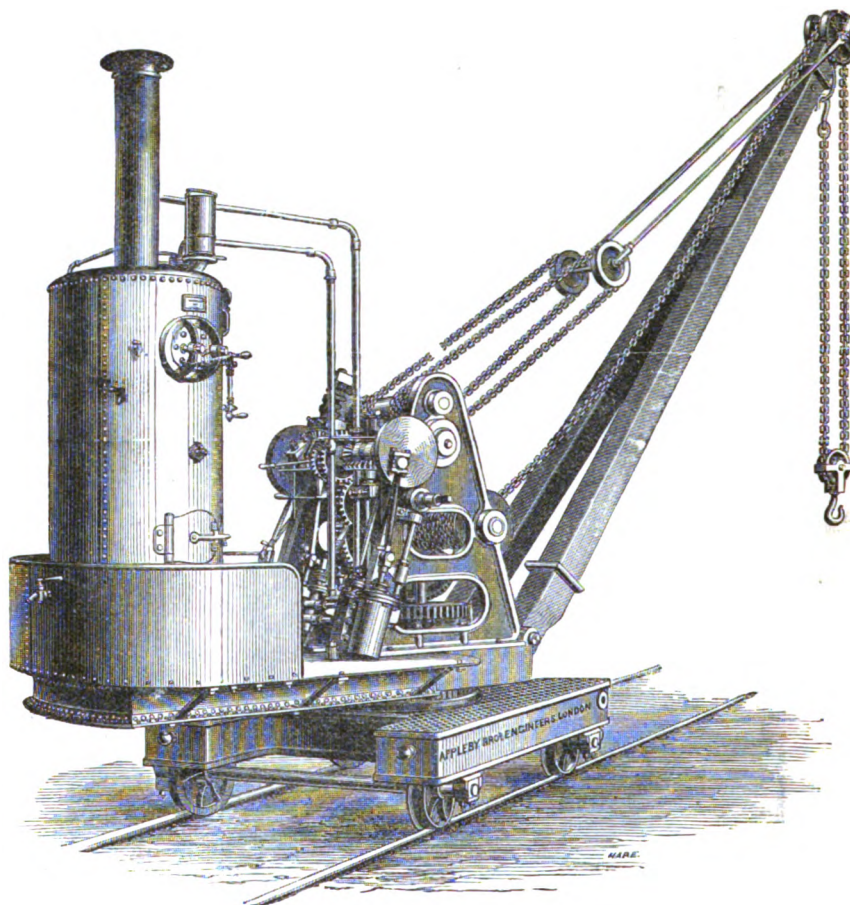
ENGINEERS, EMERSON STREET, SOUTHWARK, LONDON, S.E.

M

LOCOMOTIVE STEAM-CRANE, WITH STEAM DERRICK MOTION.

PRIZE MEDALS.—PARIS, 1867, AND VIENNA, 1873.

No. 41.



These Cranes are easily worked by one man; and the working expenses in London, including driver, fuel, oil, wipings, &c., is about 12s. per day; the average daily work done by the small Cranes during several months having been 300 tons lifted 30 feet high and deposited in trucks.

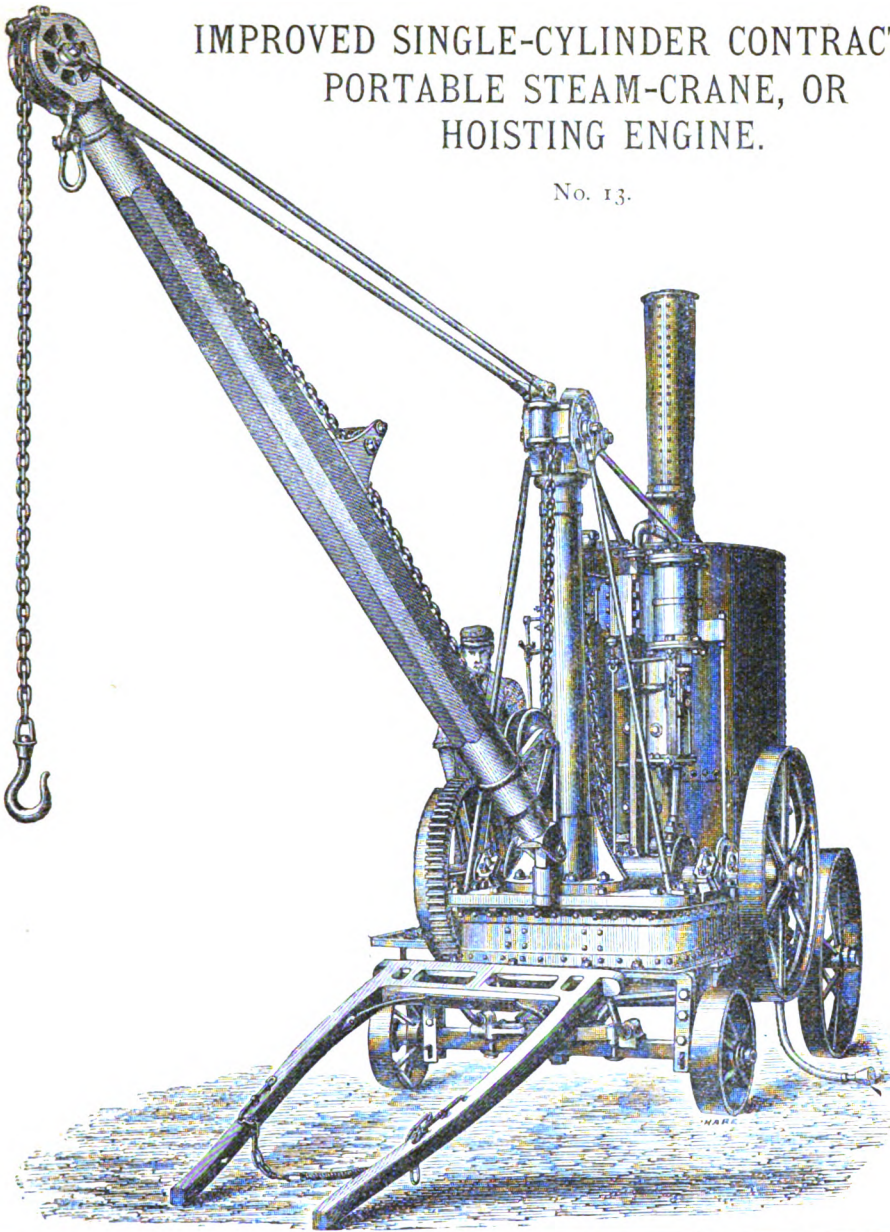
No.	With 2 Cylinders, to lift.. .. .	2 Tons.	3 Tons.	5 Tons.	7 Tons.	10 Tons.
40	Lifts and turns by steam	£ 360	£ 410	£ 540	£ 600	£ 800
41	Lifts, turns, and alters radius; all by steam	380	430	565	625	830
42	Jib of fixed radius, lifts, turns, and travels by steam ..	..	435	570	630	840
43	Lifts, turns, travels, and alters radius by steam ..	..	450	590	650	870
	To lift and travel by hand extra	5	5	5	6	7
	Rail Clips, per set of four	5	6	6	7	8
	Lagging, Felting, and Covering Boiler with Sheet Iron extra	13	15	15	16	16
	Galvanized Iron House	20	25	27	30	33
	Approximate weight (tons)	8	10½	13½	16½	20

Stoking tools, 25s. Fitters' tools, £2 extra. Hand Feed-Pump extra, £8 10s. Packing for Shipment, 3 per cent.

APPLEBY BROTHERS,
ENGINEERS, EMERSON STREET, SOUTHWARK, LONDON, S.E.

IMPROVED SINGLE-CYLINDER CONTRACTOR'S PORTABLE STEAM-CRANE, OR HOISTING ENGINE.

No. 13.



NOMINAL HORSE-POWER	SINGLE CYLINDER.					DOUBLE CYLINDER.		
	3	4	6	8	12	6	8	12
Diameter of Cylinder	5½ in.	6½ in.	7½ in.	9 in.	11 in.	5½ in.	6½ in.	7½ in.
Price with Road Wheels, Shafts, and Locking Plate	£ 190	£ 228	£ 200	£ 295	£ 370	£ 286	£ 355	£ 415
„ Plain or Flanged Wheels for Trams or Railway (without Shafts and Locking Plate)	185	223	235	289	360	281	350	405
„ Without Wheels and Axles (for fixing on timber, brick, or other foundations)	180	218	249	282	352	275	343	397
Extra for Governors and Expansion Valve	10	12	13	20	25	15	20	25
„ Link-Motion Reversing Gear	7	8	10	11	12	15	18	20
„ Felting, Lagging, and Covering Boiler with Sheet Iron	10	12	13	15	16	13	15	17
„ Skeleton Roof	8	9	10	10	10	10	10	10
„ Packing for Shipment	7	8	9	10	12	9	10	12
Approximate weight (tons)	3½	4½	5	7½	8½	4	7½	8½

APPLEBY BROTHERS,
ENGINEERS, EMERSON STREET, SOUTHWARK, LONDON, S.E.

SINGLE-CYLINDER

The general arrangement of Engine, Boiler, Gear, and Framing, is similar to Steam Crane No. 13, but the chain barrel is made larger in diameter, to obtain a high speed in working.

The Boiler has an ashpit, so that the barrow lift can be put upon a timber staging, or in any other convenient place, without danger.

The chain leads off the opposite sides of the barrel, as shown in the engraving, so that as the barrel revolves, one barrow, sack, &c., ascends, whilst the other descends. The Engine has a link-motion for reversing, and a powerful foot-brake for stopping the Engine instantly, whenever required. The winding apparatus can be thrown out of gear, when the Engine can be used for driving ordinary machinery.

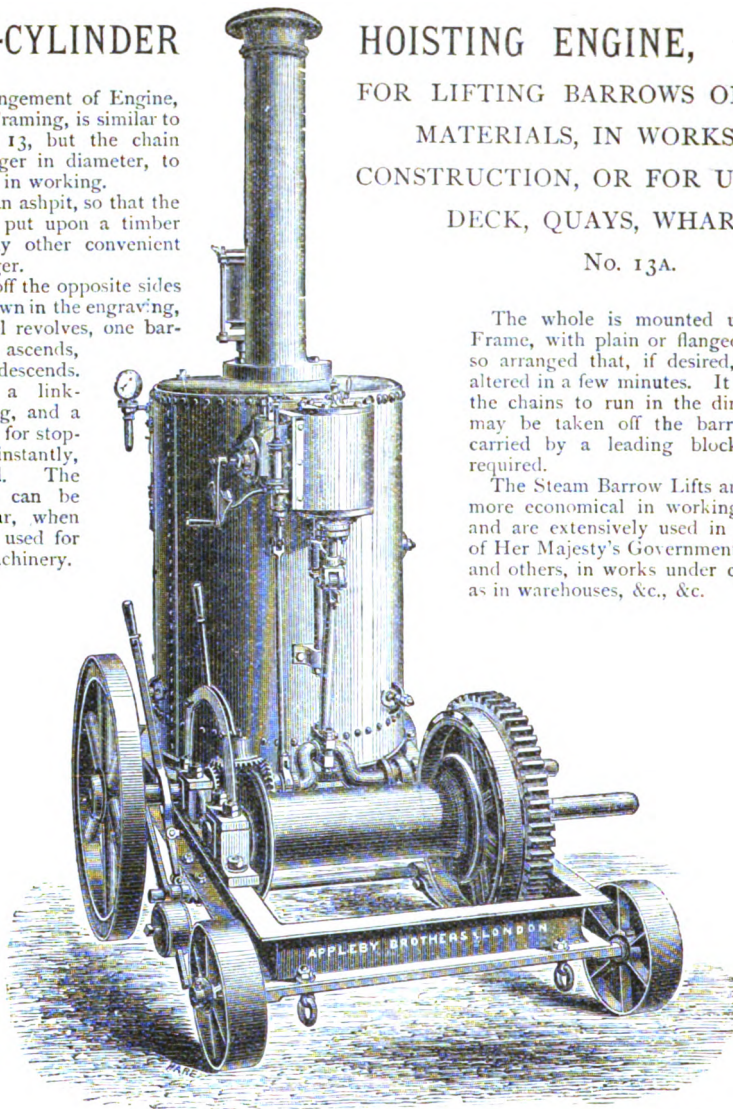
HOISTING ENGINE,

FOR LIFTING BARROWS OR BUILDING MATERIALS, IN WORKS UNDER CONSTRUCTION, OR FOR USE ON SHIP'S DECK, QUAYS, WHARFS, &c.

No. 13A.

The whole is mounted upon a strong Iron Frame, with plain or flanged wheels, which are so arranged that, if desired, the gauge may be altered in a few minutes. It is not necessary for the chains to run in the direction shown; they may be taken off the barrel horizontally, and carried by a leading block in any direction required.

The Steam Barrow Lifts are much quicker and more economical in working than horse-power, and are extensively used in various departments of Her Majesty's Government, and by contractors and others, in works under construction, as well as in warehouses, &c., &c.



	SINGLE CYLINDER.					DOUBLE CYLINDER.		
NOMINAL HORSE-POWER	3	4	6	8	12	6	8	12
Diameter of Cylinder	5½"	6½"	7½"	9"	11"	5½"	6½"	7½"
Price, with Plain or Flanged Wheels for Tram or Rails (without Shafts and Locking Plate) as shown ..	£ 155	£ 195	£ 220	£ 245	£ 315	£ 250	£ 288	£ 360
„ Without Wheels and Axles (for fixing on brick or timber)	150	190	214	238	307	244	281	352
„ With Road Wheels, Shafts, and Locking Plate ..	160	202	228	255	325	255	295	370
Extra for Governors and Expansion Valve	10	12	13	20	25	15	20	25
„ Link-Motion Reversing Gear	7	8	10	11	12	15	18	20
„ Felting, Lagging, and Covering Boiler with Sheet Iron	10	12	13	15	16	13	15	17
„ Skeleton Roof	8	9	10	10	10	10	10	10
„ Packing for Shipment	6	7	8	9	10	8	9	10
Approximate weight (tons)	2½	3½	3½	5½	7½	3½	6	7½

APPLEBY BROTHERS,
ENGINEERS, EMERSON STREET, SOUTHWARK, LONDON, S.E.

APPLEBY'S IMPROVED STEAM PILE-DRIVING MACHINE. No. 15A.

The advantages claimed for these machines are their cheapness, compactness, and adaptability for a variety of work.

The boiler, which is of ample power and strength, may be mounted on the frame (as shown in the engraving), or it may be placed in any convenient position, and connected with the engine by a wrought-iron pipe, to dispense with the flexible hose, which is liable to fracture unless used with great care.

This apparatus is frequently applied to the ordinary hand piling engine in a few hours, and at little cost beyond that of the boiler and engine work.

The general arrangement of the pile driver is shown in the engraving, sufficiently to render it perfectly intelligible with the following short explanation:

The "monkey" or ram, and the chain, are the same as those used for the ordinary hand-engines; the "nippers" only are specially adapted for the greater speed required when working by steam, so that the ram will make 10

strokes per minute, or less, in proportion to the fall required.

The machine may be set to drive piles at any convenient angle with its base, and the pile is pitched into its position for driving, by the chain in a very short time, without a rope.

As the ram will drive as low as the base of the engine, the "dolly" is not required.

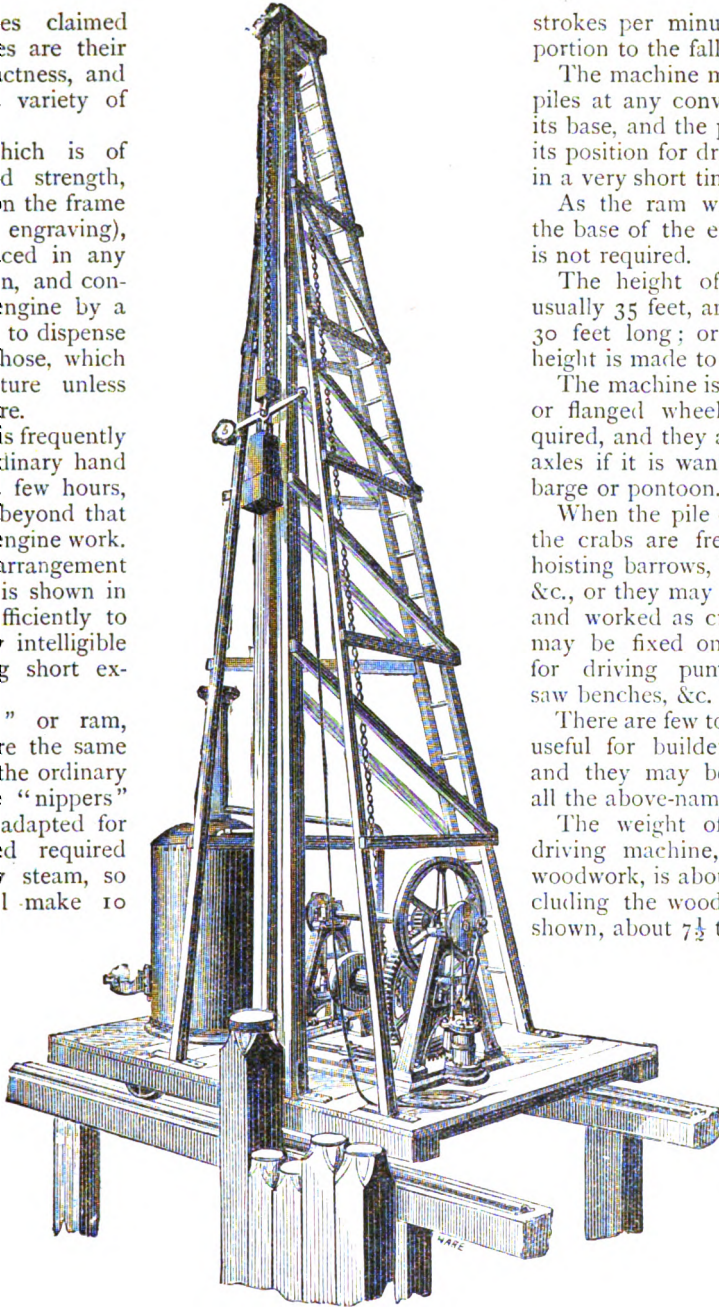
The height of the machine is usually 35 feet, and will drive a pile 30 feet long; or a greater or less height is made to order.

The machine is mounted on plain or flanged wheels, as may be required, and they are slipped off the axles if it is wanted to work on a barge or pontoon.

When the pile driving is finished, the crabs are frequently used for hoisting barrows, building materials, &c., or they may be fitted with jibs, and worked as cranes; or a pulley may be fixed on the engine shaft, for driving pumps, mortar pans, saw benches, &c.

There are few tools more generally useful for builders or contractors, and they may be seen in work for all the above-named purposes.

The weight of the steam pile-driving machine, but exclusive of woodwork, is about $4\frac{1}{4}$ tons, and including the woodwork, complete as shown, about $7\frac{1}{2}$ tons.

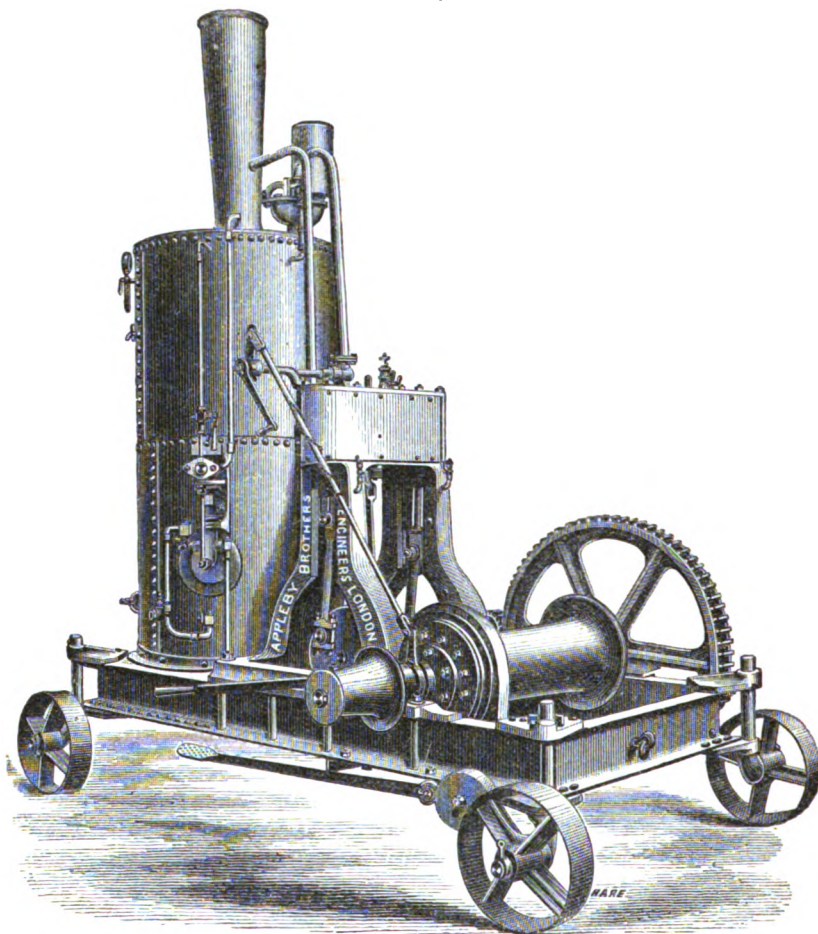


No. 15A, price complete, with woodwork	£270	0	0
Price of the CRAB or WINCH, with Block Brake, for Pile Driving, and also with Strap Brake for general hoisting purposes	105	0	0
Price of the CRAB, with BOILER, Feed Pump, and all connections, as shown	200	0	0
One-Ton Monkey Patent Nippers, Top Sheave and Bearings, and 80 feet of Best Tested Chain	26	0	0
Two pairs of Wheels and Axles, with Bearings	10	0	0

APPLEBY BROTHERS,
ENGINEERS, EMERSON STREET, SOUTHWARK, LONDON, S.E.

APPLEBY'S IMPROVED STEAM PILE-DRIVER.

No. 15B.



The improvements in this arrangement of machinery admit of a larger number of blows being made per minute than can be obtained by any other system employing the single rope or chain ; and the whole of the parts have been designed with a view of obtaining the greatest rigidity and strength, so as to reduce wear and tear to a minimum.

The lifting gear is of single purchase, and is usually proportioned for working with a monkey not exceeding one ton in weight. The barrel is loose on the shaft, and is made fast to it by a powerful conical friction clutch, which is thrown in and out of contact with the barrel by the hand lever shown in the engraving ; this lever is also connected by a rod to the throttle valve, which automatically regulates the supply of steam.

The capstan end is used for pitching piles or hauling ; and the strap brake is worked by the foot lever, and used for preventing the chain from overhauling too much, or for holding the load.

The boiler is of ample power, and is fitted with all steam and furnace mountings, and feed pump.

The engine has been specially designed for driving piles with a machine of the ordinary type (as shown at No. 15A).

Price, with two 6-inch Cylinders complete, £280. Weight, about 5½ tons.

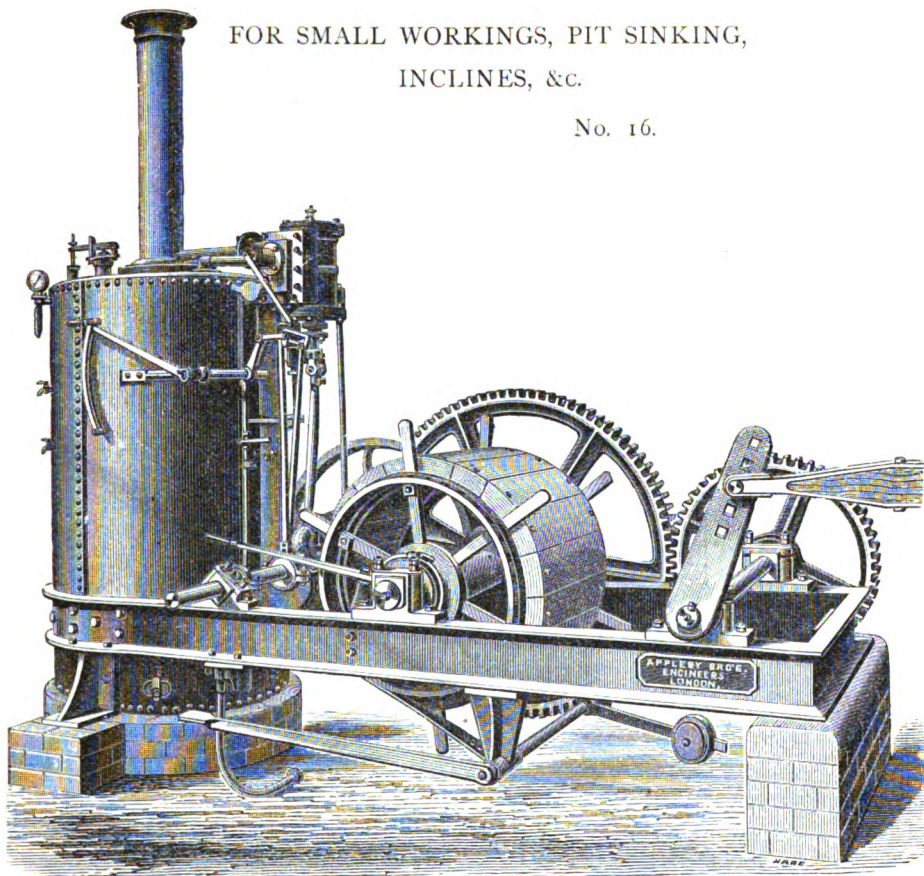
Packing for Shipment extra.

APPLEBY BROTHERS,
ENGINEERS, EMERSON STREET, SOUTHWARK, LONDON, S.E.

SINGLE-CYLINDER WINDING AND PUMPING ENGINE,

FOR SMALL WORKINGS, PIT SINKING,
INCLINES, &c.

No. 16.



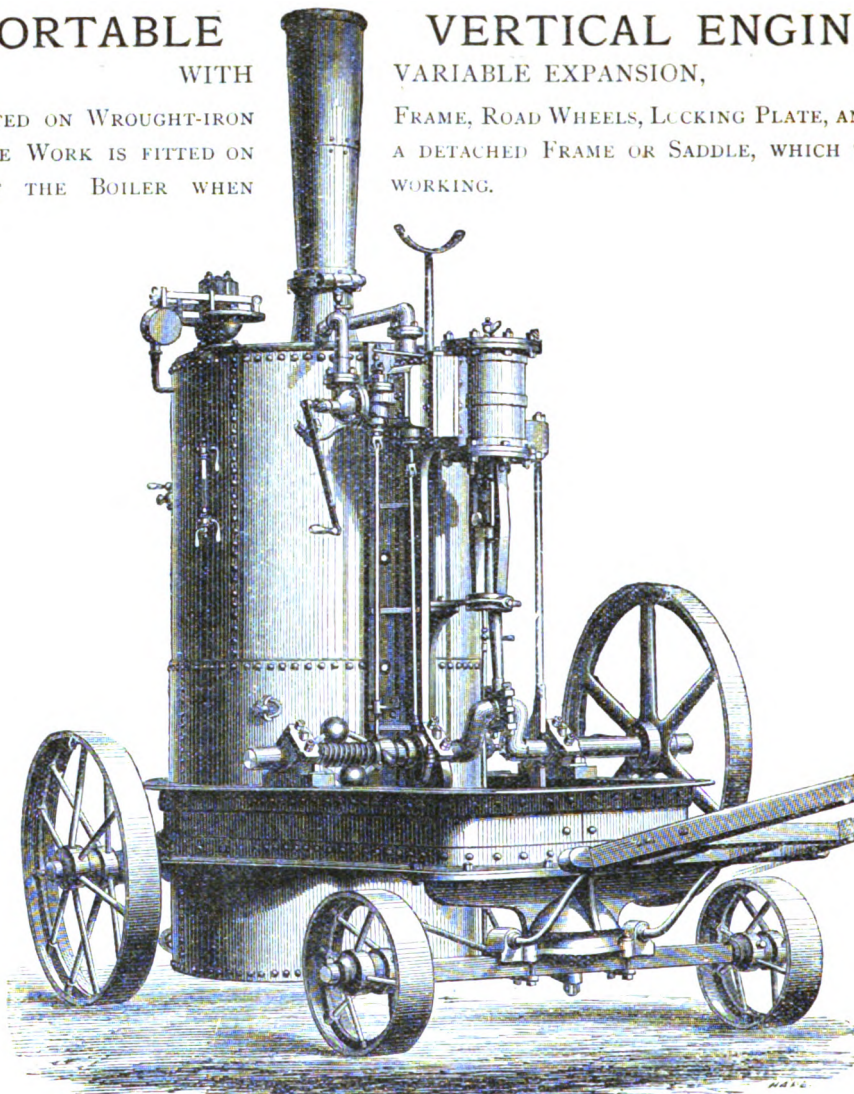
The Boiler with all fittings, the Engine with reversing motion, and the Gearing with foot brake, are mounted on a strong iron frame, and the whole can be readily removed; the Drum is made with wrought-iron arms and wood lagging for any kind of rope, and has been speeded to run, according to circumstances, at from 50 to 300 feet per minute, and the pumping gear from 8 to 40 strokes per minute; provision is made for throwing out of gear either the winding drum or the pumping arm, as occasion may require.

Although originally made for small workings widely separated, where manual labour was expensive, and where a large outlay in machinery was undesirable, these Engines have been found to give such satisfactory working results that they have been made of almost every size from 3 to 30 horse-power (nominal), and with one or two cylinders.

COMPLETE WITH FEED PUMP.				Diameter of Cylinder.	Price as shown.	If without Pumping Arm and Gear.	Extra, if Lock- ing Plate, Road Wheels, and Shafts.
3 horse-power, as per Engraving	..	..	..	inches.	£	£	£
4 " " "	..	..	..	5 $\frac{1}{2}$	170	165	10
6 " " "	..	..	..	6 $\frac{1}{2}$	205	198	12
8 " " "	..	..	..	7 $\frac{1}{2}$	230	220	15
10 " " "	..	..	..	9	285	270	20
12 " " "	..	..	..	10	325	305	20
	..	..	..	11	370	345	25

APPLEBY BROTHERS,
ENGINEERS, EMERSON STREET, SOUTHWARK, LONDON, S.E.

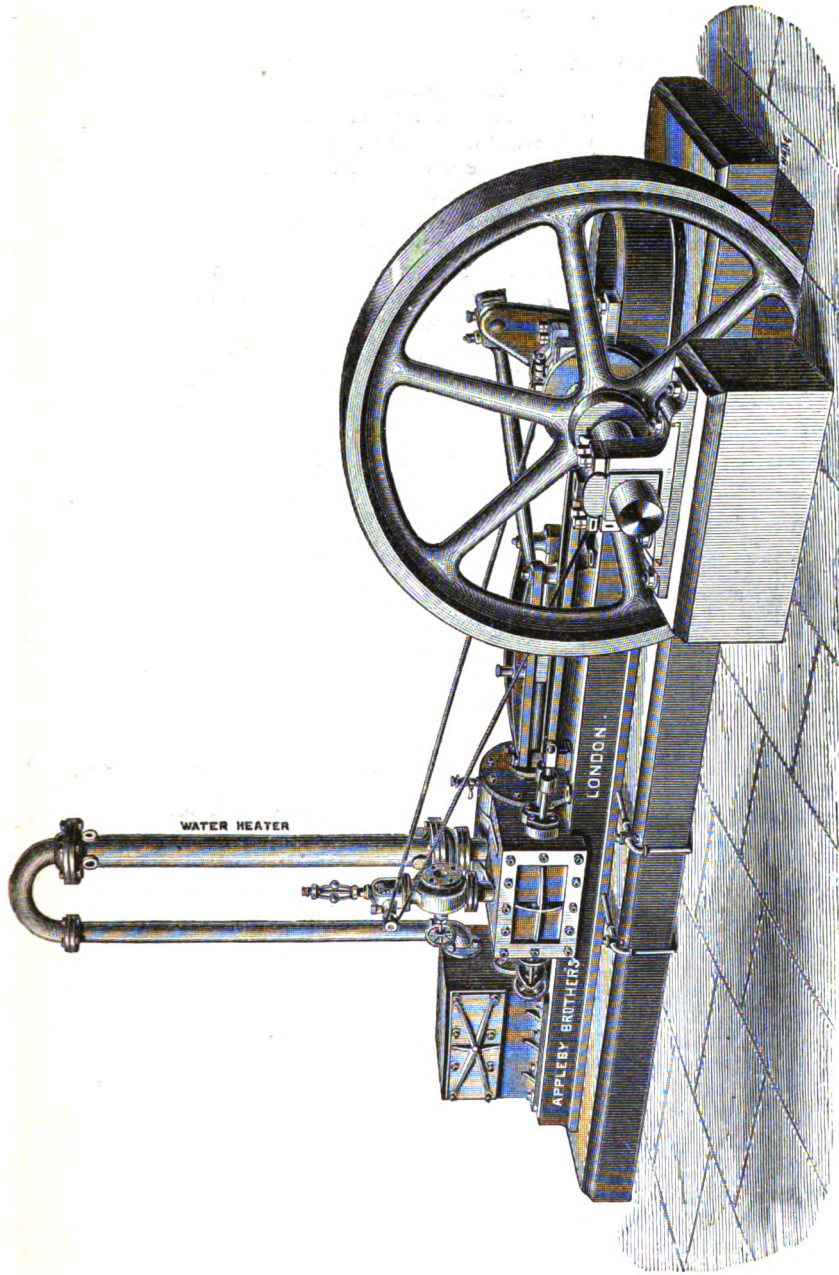
PORTABLE **VERTICAL ENGINE,**
 WITH VARIABLE EXPANSION,
 AND MOUNTED ON WROUGHT-IRON FRAME, ROAD WHEELS, LOCKING PLATE, AND SHAFTS.
 THE ENGINE WORK IS FITTED ON A DETACHED FRAME OR SADDLE, WHICH TAKES ALL
 STRAIN OFF THE BOILER WHEN WORKING.



PORTABLE.	SINGLE CYLINDER.						DOUBLE CYLINDERS.		
NOMINAL HORSE-POWER	3	4	6	8	10	12	6	8	12
Diameter of Cylinder	5½	6½	7½	9	10	11	5½	6½	7½
Engine, with Governors, as shown Price	£117	£163	£202	£241	£280	£320	£230	£281	£365
Extra for Link-Motion Reversing Gear	7	8	10	11	12	12	15	18	20
Extra for Felted, Lagging, and Covering Boiler } with Sheet Iron	10	12	13	15	16	16	13	15	17
Approximate weight in tons	2	2½	3½	3¾	4½	4¾	3½	4	5
Approximate measurement in cubic feet	150	160	300	380	450	500	300	390	510

Packing for short voyages costs about 3 per cent. ; and for long voyages about 5 per cent.
 Engines under 8 horse-power are not fitted with the variable expansion valve.

APPLEBY BROTHERS,
 ENGINEERS, EMERSON STREET, SOUTHWARK, LONDON, S.E.

Horizontal High-pressure and Condensing Steam Engine.

The greatly increased cost of fuel, and the growing demand for Engines which shall be cheap in use, rather than in first cost, has led to the production of the design shown in the accompanying Engraving, in which the details of construction have been most carefully considered; and the high duty which has been obtained from Engines of this construction fully demonstrates that COMMERCIAL ECONOMY IS TO BE FOUND IN PERFECTION OF DESIGN AND WORKMANSHIP RATHER THAN IN A LOW FIRST COST. The Cylinders are fitted with steam jackets and are lagged and felted; the valve chest is the full length of the Cylinder, with double sets of ports and valves at each end, saving the filling of the long steam-ports at each stroke; the valve motion is adjustable to any point of cut-off, whilst running, by the small hand-wheel at the back of slide jacket, and an index shows the point of cut-off; the glands are all of great length, bushed with gun metal; the guide bars are double, and the guide blocks of great length; the bottom guide bars are planed to form an oil channel for the blocks to work in. The centre line of the Engine is brought

APPLEBY BROTHERS,
ENGINEERS, EMERSON STREET, SOUTHWARK, LONDON, S.E.

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Horizontal High-pressure and Condensing Steam Engine—continued.

down as nearly as possible to the level of the bed plate. The connecting rod is of the proportion of about $2\frac{1}{2}$ to 1 of the stroke of the Engine, and is of forged scrap-iron, the crank-pin end being solid and fitted with gun-metal bearing, adjusting key, and lubricator; the cross-head end is also fitted with gun-metal bearing, cotters, and lubricators. The crank shaft and crank is of hammered iron, forged solid, and shaped all over.

The cross-head is of scrap iron, cotted to the steel piston-rod. The bearings of the crank shaft are of gun metal made of great length, giving a large area of bearing surface, and are adjustable in all directions. The fly wheel is of ample weight, turned on face and edges. The Condenser and air pump are placed on the bed plate behind the Cylinder, and the air-pump piston is coupled direct to the steam piston, the rod of which is continued through the back cover. The air pump in the large sizes is double acting, and is fitted with metallic piston, gun-metal grid, valves and guards, and india-rubber discs, injection cock and pipe. The feeding pump is worked from the cross-head, and is fitted with gun-metal clack boxes and valves, and is placed on the opposite side of Cylinder to valve jacket. An improved water heater can be fitted between the exhaust branch on the Cylinder and the Condenser, capable of raising the water drawn from the hot well at about 80° to 100° before entering the boiler. An improved high-speed governor regulates the speed of the Engine, or if desired it can be attached to the valve motion, so as to make the cut-off automatic, at a slightly increased cost beyond that given in annexed list. The smallest sizes of Engines in list, up to 10 horse-power, have only one set of ports in middle of Cylinder, and the air pump is single acting.

HIGH-PRESSURE AND CONDENSING ENGINE.

Horse-power of Engine ..	6 H.-p.	8 H.-p.	10 H.-p.	12 H.-p.	16 H.-p.	20 H.-p.	25 H.-p.	30 H.-p.	35 H.-p.	40 H.-p.	50 H.-p.
Diameter of Cylinder ..	8 in.	9 in.	11 in.	12 in.	14 $\frac{1}{2}$ in.	16 in.	18 in.	20 in.	21 in.	22 in.	24 in.
Price of Engine only ..	£ 120 0	£ 147	£ 170 0	£ 236	£ 278 0	£ 336	£ 420	£ 475	£ 530	£ 600	£ 690
„ Feed Pump, EXTRA	5 5	6	7 5	8	9 12	12	15	18	21	24	30
„ Expansion Gear, EXTRA ..	8 0	10	12 0	14	16 0	20	25	30	35	40	50
„ Engine and Cornish Boiler, with Feed Pump and fittings complete, as described (Expansion Gear not included)	216 0	272	310 0	405	490 0	600	750	860	940	1030	1190

One of these Engines can be inspected in work at Messrs. APPLEBY BROTHERS' Works, Emerson Street, Southwark.

THE PATENT EVAPORATIVE SURFACE-CONDENSER.

Where water is scarce or dear this is a *most invaluable adjunct*, as it dispenses altogether with the large quantity of water required by the ordinary method of condensation, and allows the use of a condensing Engine where otherwise it would be impossible to adopt one (for instance, at A. B.s' London Works). By this method, only so much water is lost by evaporation from the outside of the pipes as is equivalent to that which is gained by the condensation of the escaping steam within; and practically, little more water is required for working this apparatus than would be used by an ordinary high-pressure engine of equal power, because the same condensed water is worked over and over again, and returned each time to the boiler in a heated state, but of course considerably below boiling point.

The apparatus may be fixed at any distance from the Engine—on the roof of a building or in any other outside place—as may be most convenient, and the more exposed the better, without in any way affecting the vacuum, which can be maintained steadily at about 25 inches or more.

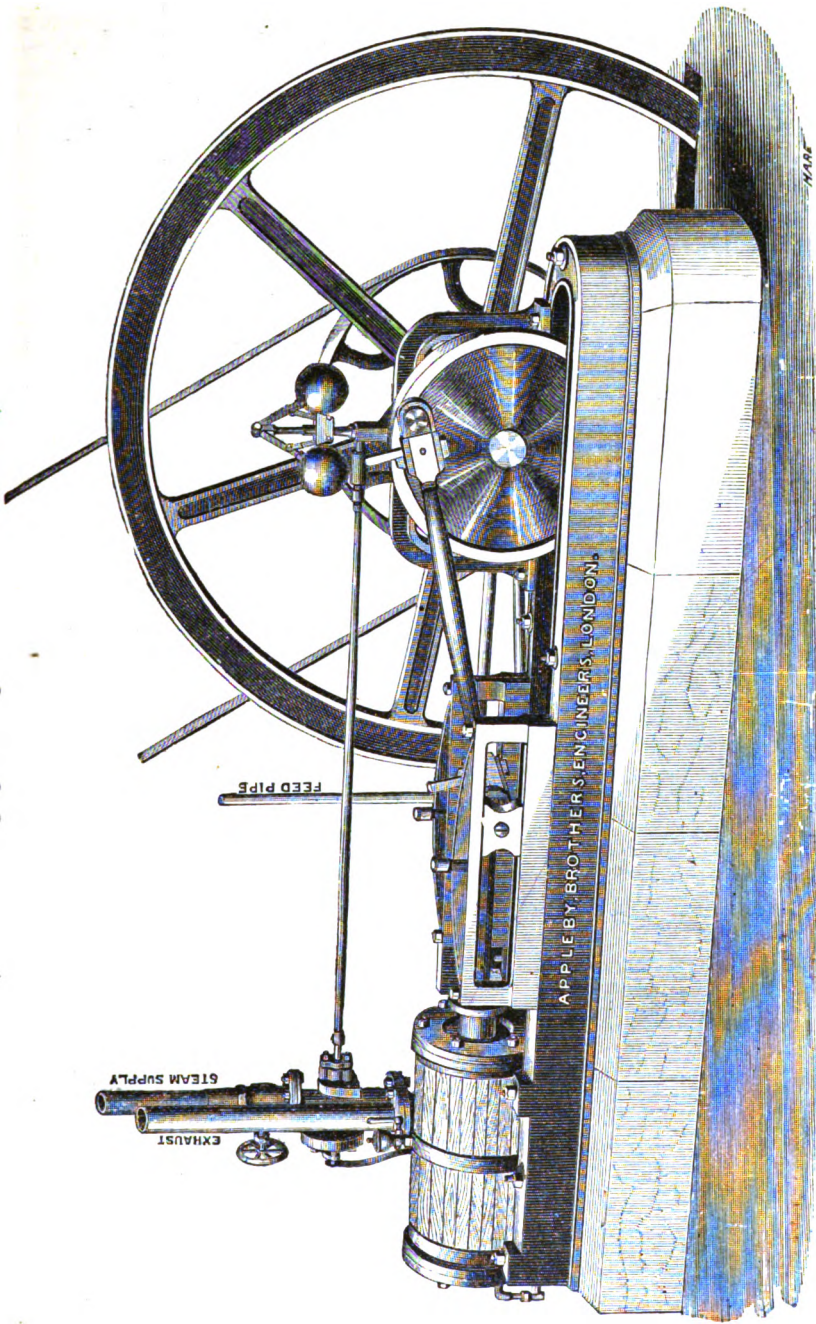
The steam to be condensed is carried from the exhaust into a coil box, in an elevated and exposed place, and thence spreading itself through a series of horizontal copper pipes is condensed by a shower of water (which need not even be cold) that is caused to flow over the exterior of the pipes by means of a copper serrated trough at the top, and the whole of the water then flows back to the pump and is pumped again into the boiler; this process is continued as long as the Engine is at work. Ample provision is made for the expansion of the pipes without disturbance to the joints.

Messrs. APPLEBY BROTHERS have this form of Condenser in constant operation at their Works, both in London and Leicester, and will be glad to show it to intending purchasers and give prices for applying it.

APPLEBY BROTHERS,
ENGINEERS, EMERSON STREET, SOUTHWARK, LONDON, S.E.

HORIZONTAL HIGH-PRESSURE AND CONDENSING ENGINE

(From a Photograph of Engine with 12-inch Cylinder).



The principle of this Engine is **DIRECT ACTION**, the working parts are easy of access, and are secured to a strong metal Foundation Plate, provided with bolts and nuts for fastening to stone, or brickwork, or wood framing.

The Cylinder has turned flanges, bright polished cover, metallic piston with steel segment, brass tongues, and steel springs, piston rod of best cast-steel, bright cross-head, cross-shaft with blocks lined with gun metal, two sets of slide bars planed and scraped, crank shaft of best hammered scrap iron, working in gun-metal bearings, bright turned connecting rod with gun-metal head, &c., polished gun-metal eccentric strap, with bright rod fitted to valve motion, force pump with gun metal clacks

APPLEBY BROTHERS,

ENGINEERS, EMERSON STREET, SOUTHWARK, LONDON, S.E.

N 2

FIXED HORIZONTAL HIGH-PRESSURE STEAM ENGINE, WITH CYLINDRICAL CORNISH BOILER—continued.

and seatings, air vessel and covers, easily accessible, bright governors and levers, heavy fly-wheel accurately balanced and turned on the edge for a strap if necessary. The steam is supplied from a CYLINDRICAL CORNISH BOILER, of ample size and strength, with one tube (or in the larger sizes *two* tubes) through the whole length, made of best materials and tested to a high pressure, and fitted with patent steam gauge, water gauge and cock, safety valve, blow-off cock, furnace door, fire bars, bearer and dead plate, and every necessary for the safe, efficient, and economical working of the whole. The annexed prices include all complete to the end of fly-wheel shaft, but exclusive of pipes to connect Engine and Boiler (which will vary according to the distance apart) :—

Horse-power of Engine Diameter of Cylinder	4 H.-p. 6½ in.	6 H.-p. 8 in.	8 H.-p. 9 in.	10 H.-p. 11 in.	12 H.-p. 12 in.	16 H.-p. 14½ in.	20 H.-p. 16 in.	25 H.-p. 18 in.	30 H.-p. 20 in.	35 H.-p. 21 in.	40 H.-p. 22 in.	50 H.-p. 24 in.
Price of Engine only	£ 53 10	£ 77 0	£ 100 0	£ 119 0	£ 141 0	£ 190 0	£ 230 0	£ 318 0	£ 370 0	£ 420 0	£ 475 0	£ 590 0
Price of Feed Pump, EXTRA ..	4 0	5 5	6 6	7 5	8 8	9 12	12 12	15 15	18 18	21 21	24 24	30 30
Price of Engine and Cornish Boiler, with Feed Pump and fittings complete, as described	130 10	166 0	214 0	246 0	294 0	390 0	485 0	620 0	725 0	792 0	865 0	1040 0
Price of Expansion Gear, EXTRA	..	8 0	10 10	12 0	14 14	16 0	20 20	25 25	30 30	35 35	40 40	50 50
Average Consumption of Com- mon Coal per hour at 45 lb. pressure	32 lb.	42 lb.	56 lb.	70 lb.	84 lb.	112 lb.	136 lb.	172 lb.	205 lb.	..	275 lb.	340 lb.
Average Evaporation of Water per hour at 45 lb. pressure ..	22 Gals.	30 Gals.	40 Gals.	50 Gals.	60 Gals.	80 Gals.	100 Gals.	125 Gals.	150 Gals.	..	200 Gals.	250 Gals.
Ditto Consumption of Water when ordinary Condenser is added	250 "	380 "	500 "	630 "	750 "	1000 "	1300 "	1700 "	2000 "	..	2500 "	3000 "
Approximate Weight of Engine, packed	18 cwt.	45 cwt.	48 cwt.	50 cwt.	70 cwt.	100 cwt.	115 cwt.	130 cwt.	160 cwt.	..	2500 "	3000 "
Ditto ditto of Boiler and Fittings	26 "	45 "	50 "	57 "	70 "	115 "	120 "	140 "	230 "	..	2500 "	3000 "
Approximate Measurement of Engine when packed, in cubic feet	40 ft.	83 ft.	90 ft.	95 ft.	145 ft.	215 ft.	245 ft.	260 ft.	280 ft.	..	2500 "	3000 "

For EXPORTATION it is advisable to send with each Engine a set of EXTRAS as follows : 2 pairs of main-shaft brasses, 1 set of brasses for large end of connecting rod, 1 set of piston rings and springs, 1 set of eccentric brasses, 1 set of furnace bars for boiler, and 6 gauge glasses and rings.

Link-Motion Reversing Gear can be attached at an extra charge.

Horizontal Engines from 10 horse-power with 2 CYLINDERS, if required. SPECIAL QUOTATIONS GIVEN FOR LARGER SIZES THAN LIST.

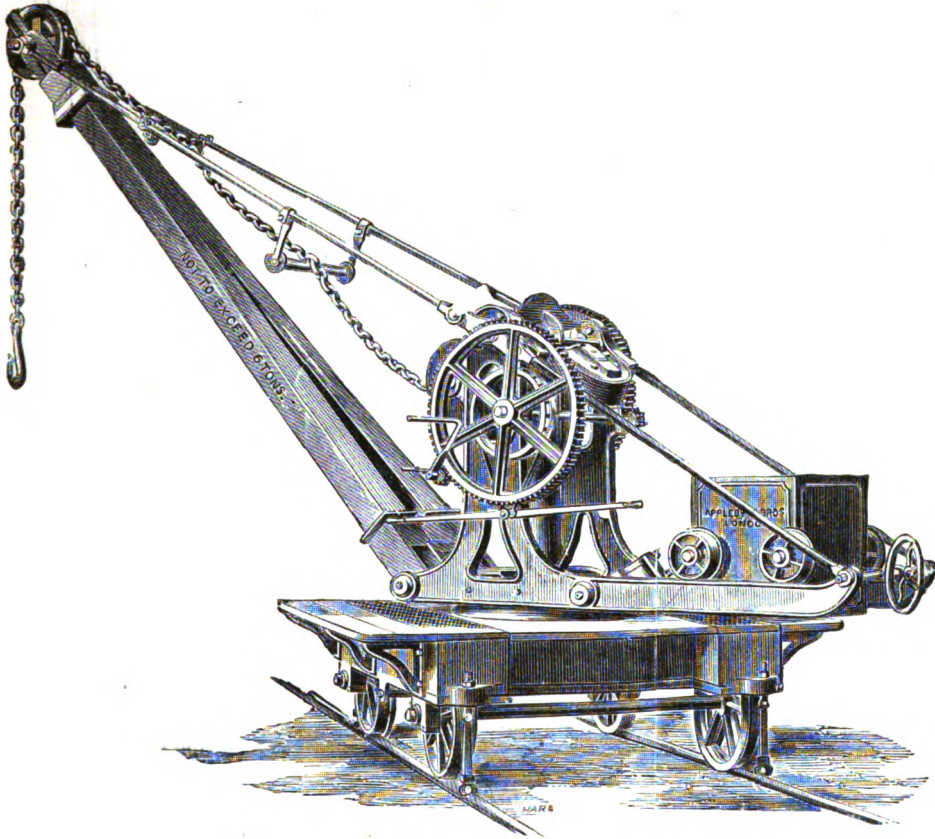
The improved Water-Heater is highly recommended, price extra from £10 to £20. For Engines of more than 30 horse-power two boilers are recommended.

Packing for Shipment, 3 per cent.

APPLEBY BROTHERS,

ENGINEERS, EMERSON STREET, SOUTHWARK, LONDON, S.E.

PORTABLE HAND CRANE, GOVERNMENT PATTERN. No. 1.



These Cranes are constructed to work loads varying from 1 to 10 tons, and can be adapted to work on any gauge of Railway. They are used by Her Majesty's Government and the Indian Government, as well as by many of the leading Railway and Dock Companies.

The Base Plate is in one massive casting, chequered on the top, and of sufficient size to allow the men to work at whatever angle the Crane may be. The Crane Post is of hammered iron; all the Wheels and Pinions are lined up to their pitch lines, the Pinions being thrown in and out of gear by *clutches*; the Journals are of great length, the Shafts run in gun-metal bearings, and the working parts throughout are accurately fitted and carefully finished.

The Balance Weight Box is of ample size, and is moved along the tail pieces by a traversing screw worked by a hand wheel. There is a Friction Roller to take the weight off the back balance and reduce friction when turning. The Engraving shows a Crane of the 6-Ton size.

Special designs and estimates will be given for *Permanent-way* and "*Accident Cranes*" for Steam or Hand Power, to run with ordinary stock, with or without Tenders, complete with Jacks, Packings, and Tool Chests, &c.

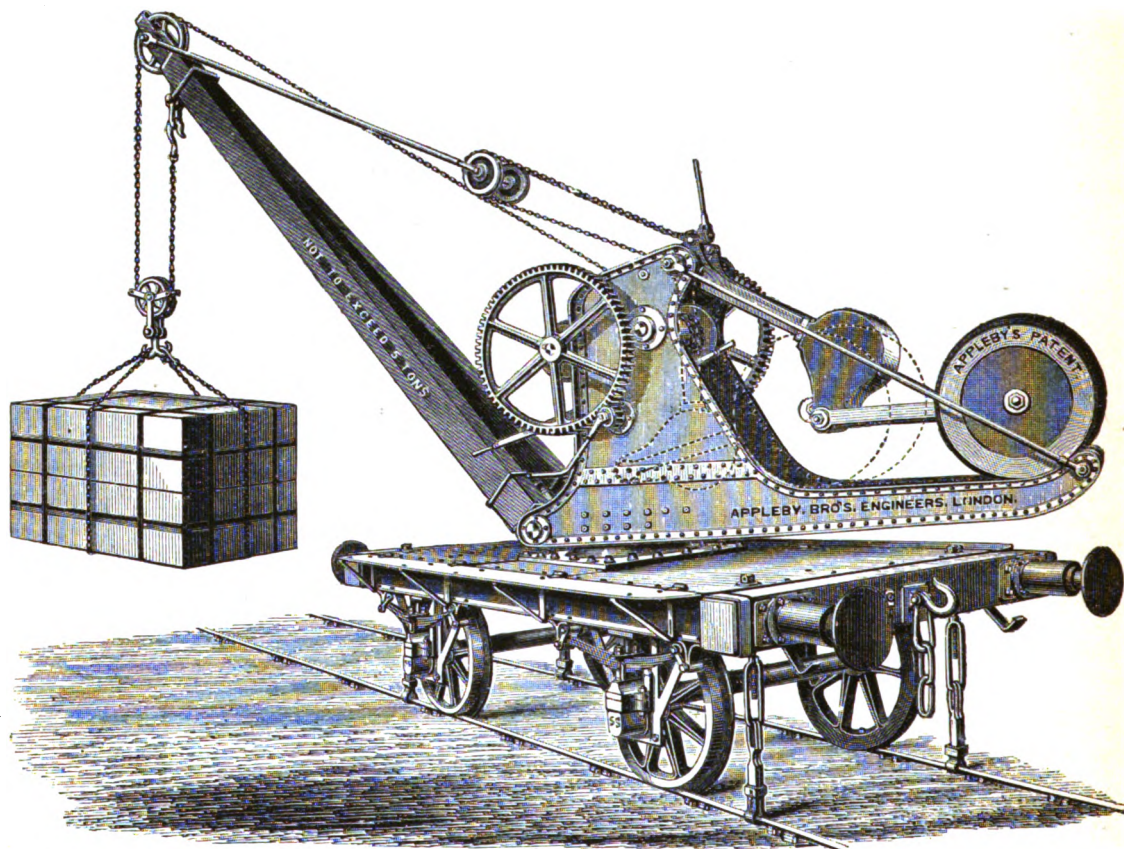
To lift	3 Tons	..	..	Price	£165	approx. weight	4½ tons.
"	5 "	..	..	"	£255	ditto	
"	6 "	..	..	"	£320	ditto	
"	10 "	..	..	"	£425	ditto	

APPLEBY BROTHERS,
ENGINEERS, EMERSON STREET, SOUTHWARK, LONDON, S.E.

PORTABLE PERMANENT-WAY CRANE,

WITH PATENT SELF-ACTING BALANCE.

No. 6.



The object attained by this invention ensures the stability of the Crane when working up to its maximum power on narrow-gauge lines, and reduces the strain on the crane obtained by a revolving self-acting counter-balance running out to an extent proportionate to the load being lifted, as is shown in the engraving; and when the load is removed the balance weight returns to the position indicated by the dotted lines.

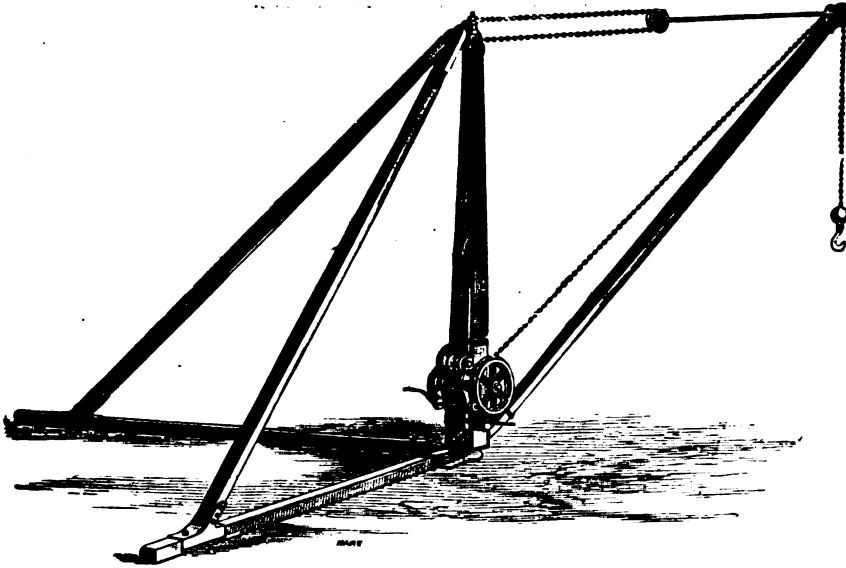
The side frame and under carriage are usually constructed of wrought iron, so as to reduce to a minimum the risk of breakage to which Cranes of this type are so liable; and, if required for running with ordinary rolling stock, they are fitted with springs, buffers, axle boxes, couplings, and all appliances for that purpose, and with apparatus for altering the radius of the jib, and for lowering it when travelling.

APPLEBY BROTHERS,

ENGINEERS, EMERSON STREET, SOUTHWARK, LONDON, S.E.

HAND DERRICK CRANE.

No. 1.



Being moderate in first cost, easily moved, and requiring no support from buildings, or great care in fixing, these Cranes are extensively used in stone yards, in constructive operations, and generally in situations where a great height of lift and varying radius is required. They are made to swing round about three-fourths of a circle. The gear is fixed at a convenient height for turning, and the chain passes direct from the lifting barrel over a pulley in the jib-head casting. The radius of the jib is varied by turning the Derrick Barrel, from which a chain runs between the upright posts over a pulley at the top, as shown above, and the arrangement is such that the load lifted nearly or quite counterbalances the strain on the gear, so that little harm can result from careless working.

The subjoined Prices include single and double purchase lifting gear with strap brake, and lever, two handles, the safety Derrick motion described above, the whole of the timbers shown, with all necessary shoes and ironwork, together with chain to reach to the ground line.

To lift	1 Ton.	2 Tons.	3 Tons.	4 Tons.	6 Tons.	8 Tons.	10 Tons.
Sweep 25 ft. ..	£47	—	—	—	—	—	—
„ 30 „ ..	£53	£64 10s.	£85 10s.	£102 10s.	£139	£188	£235
„ 35 „ ..	—	10s.	£92 10s.	£109 10s.	£148	£199	£248

wheels and Pinions are lined

clutches the Journals are of

STEAM DERRICK CRANE, WITH BOILER COMPLETE.

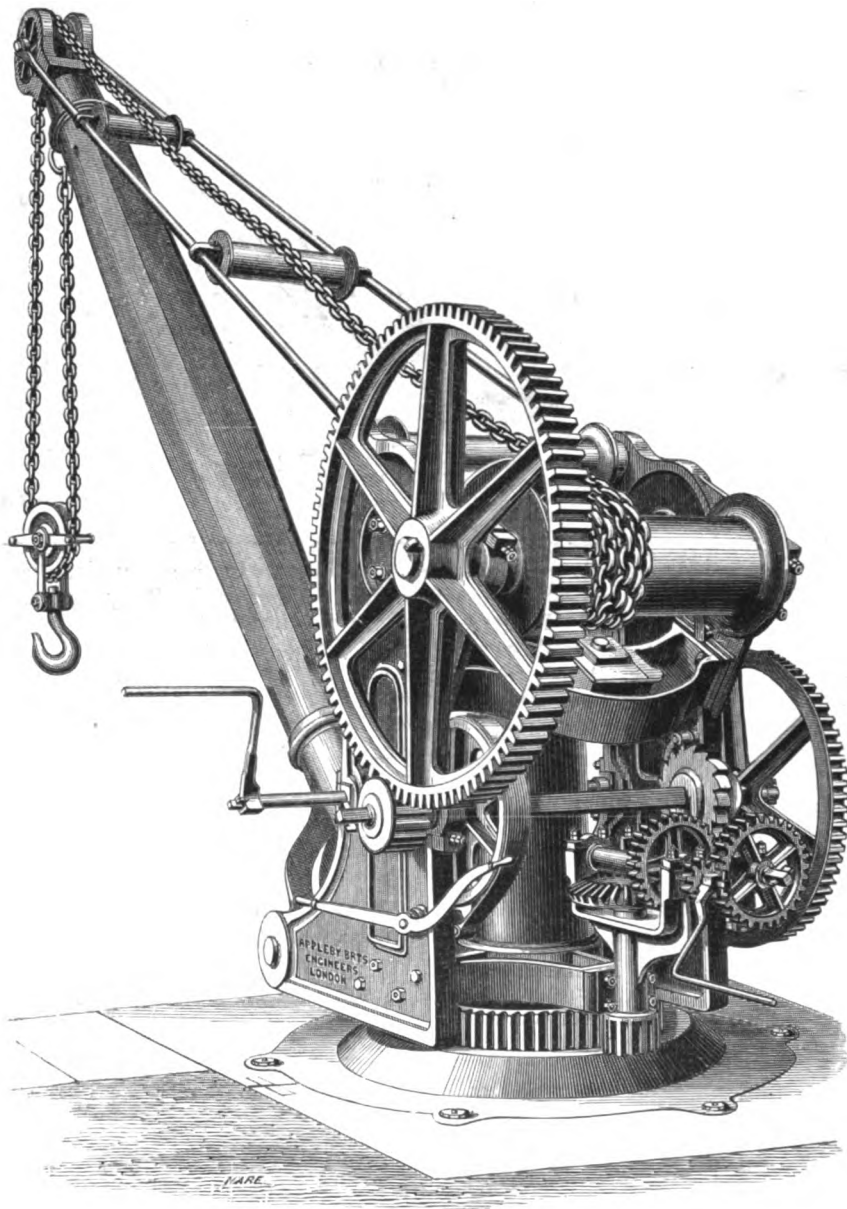
To Lift Loads.	Sweep of Jib.	To Lift Loads.	Sweep of Jib.	To Lift Loads.	Sweep of Jib.	To Lift Loads.	Sweep of Jib.
2 Tons.	25 feet.	3 Tons.	25 feet.	5 Tons.	25 feet.	10 Tons.	25 feet.
1 1/2 „	30 „	2 3/4 „	30 „	4 „	30 „	8 „	30 „
1 1/4 „	35 „	2 1/2 „	35 „	3 „	35 „	6 „	35 „
Price £200		Price £250		Price £330		Price £490	
Extra if with Slewing Motion	£17 10s.	£17 10s.		£20		£25	

With Coal at 21s. per ton, and Driver at 5s. per day, the working expenses will be about 10s. per day, and one Steam Derrick will do the work of six Hand Derricks.

APPLEBY BROTHERS,
ENGINEERS, EMERSON STREET, SOUTHWARK, LONDON, S.E.

HAND WHARF CRANE.

No. 5A, TO LIFT 20 TONS.



With wrought-iron post, slewing motion, chains, handles, &c., complete as shown. Or with wrought-iron jib.

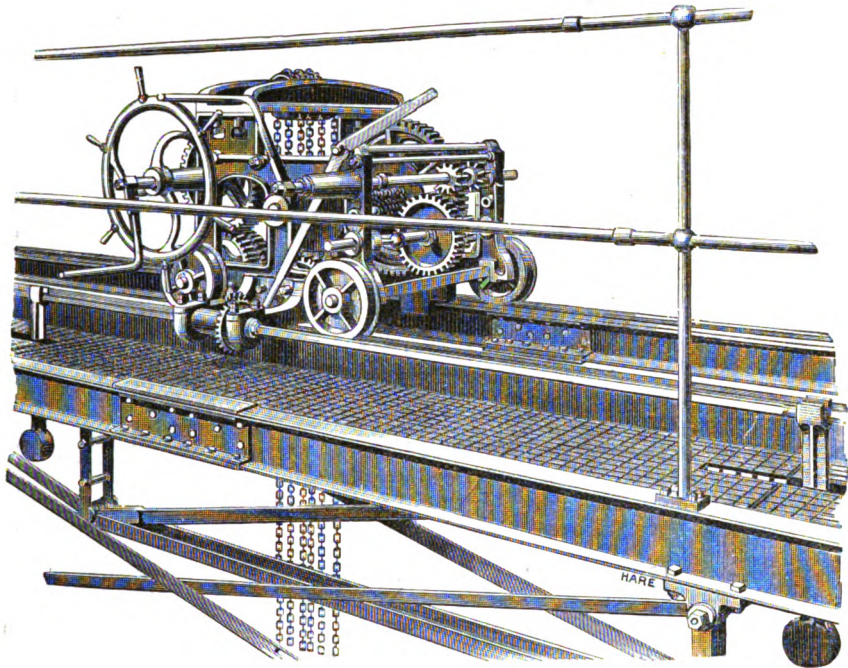
Cranes of this description are made in all sizes, to lift from 2 tons to 30 tons.

APPLEBY BROTHERS,
ENGINEERS, EMERSON STREET, SOUTHWARK, LONDON, S.E.

HAND OVERHEAD TRAVELLING CRANES.

No. 9.

These Cranes are fitted with very strong Crabs, having cast-iron sides. The gearing is of the best form for strength, safety, and noiseless working; the lifting motions are single and double purchase, and work through blocks and chains as shown; there is a pawl wheel and pawl to hold the load suspended, and also a powerful strap brake; all the motions are given by the attendant from the Crab without change of clutches, moving levers, or slipping shafts; all motions are therefore constantly in gear, and can be worked alternately or



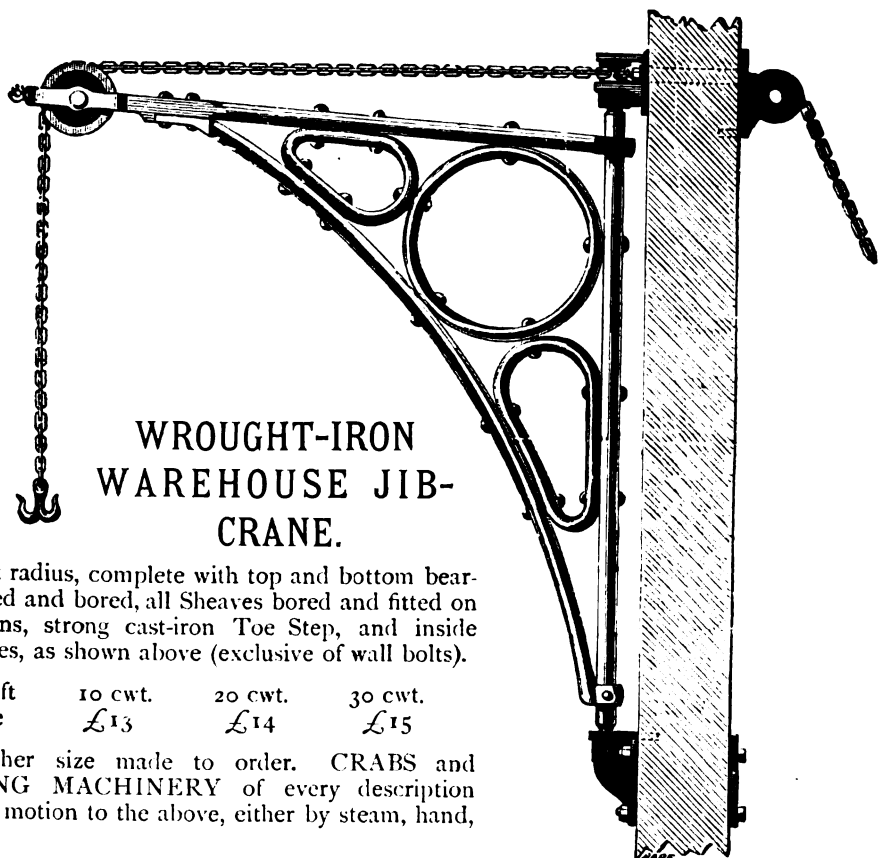
together by the attendant at the Crab. The end cradles or carriages are each in one hollow casting, with the necessary brackets cast on to it for receiving the travelling axles and girders,—the travelling wheels and gear being inside the hollow part of cradles; the travelling wheels are double flanged, and a spur ring is cast on two of the wheels; the travelling motion is given (from the Crab) by pinions gearing into the spur rings, and attached to each end of the tumbler shaft, and the whole of the motions are very quick and handy. The man-stand, or platform with handrail, *extends the full width of the gantry*, and is carried by a light additional girder, which is connected to the main girder by transverse braces at intervals, and the foot plate consists of an open trellis grating which allows the attendant to see through it the exact position of the work below. The whole is fitted together in the most careful manner and of the best material, and the strains and strengths are calculated with an ample margin for safety in working. Chains for a 15-feet lift are included. A Traveller of this type can be seen in daily use at Messrs. APPLEBY BROTHERS' Works, Emerson Street, S.E.

PRICES FOR HAND TRAVELLERS OF 40-FEET SPAN.

To Lift	With Wood Girders.	Iron Lattice-Girders, as No. 9.	Riveted Plate-Girders.
3 Tons	£ 130	£ 170	£ 190
5 " 	170	215	235
10 " 	205	275	300
15 " 	265	350	380

Special quotations given for different spans and larger or smaller sizes.

APPLEBY BROTHERS,
ENGINEERS, EMERSON STREET, SOUTHWARK, LONDON, S.E.



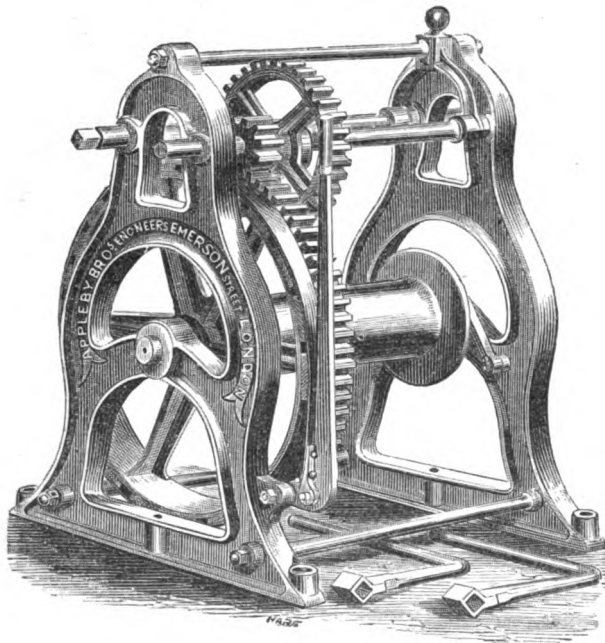
WROUGHT-IRON WAREHOUSE JIB- CRANE.

Six feet radius, complete with top and bottom bearings turned and bored, all Sheaves bored and fitted on turned pins, strong cast-iron Toe Step, and inside Wall Plates, as shown above (exclusive of wall bolts).

To lift	10 cwt.	20 cwt.	30 cwt.
Price	£13	£14	£15

Any other size made to order. CRABS and HOISTING MACHINERY of every description for giving motion to the above, either by steam, hand, or power.

No. 3. "GOVERNMENT PATTERN" STRONG CRAB, OR WINCH.



The shafts are turned throughout and the bearings are accurately bored; the subjoined prices include handles, strap break lined with hard wood, break lever, pawl wheel and pawl for holding the load suspended.

The proportions throughout are ample for working the load specified, with 2 and 3 sheave blocks, and they will lift greater weights with pulley blocks, in proportion to the number of sheaves used.

To lift	price	..	..	£	s.	d.
3 tons,	price	..	..	10	15	0
Weight about	5½ cwt.					
Ditto,	5 tons,	price	..	13	10	0
Weight about	8¼ cwt.					
Ditto,	10 tons,	price	..	22	0	0
Weight about	14 cwt.					
Ditto,	15 tons,	price	..	32	10	0
Weight about	21¼ cwt.					

With capstan ends or "fleeting barrels" extra for each end, 18s.

With gun-metal bearings for the first and second motion shaft, extra 40s., 40s., 47s., 52s.

APPLEBY BROTHERS,
ENGINEERS, EMERSON STREET, SOUTHWARK, LONDON, S.E.

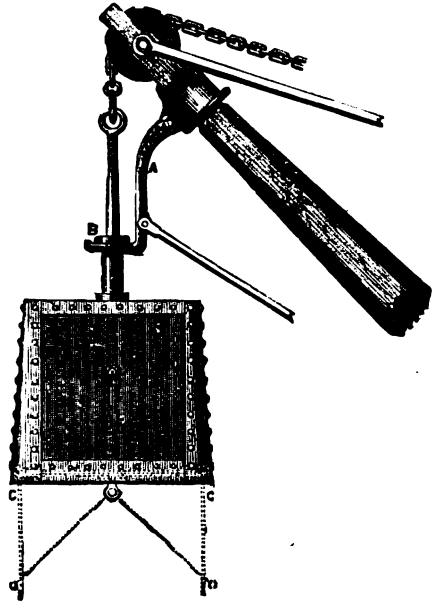
MURRAY'S PATENT SKIPS.

APPLEBY BROTHERS, SOLE PROPRIETORS AND MANUFACTURERS.

These Skips are made throughout of wrought iron, and of any required shape or size. They have been specially designed for lifting ballast, corn, coal, or other materials, and their principal advantages over the Skips ordinarily in use are: 1st. Greater safety in working. 2nd. Greater expedition in discharging. 3rd. That they can be discharged without manual labour at any height or depth. 4th. That they will stand in any position where they are left.

The mode of working the Skip is as follows: A light rod from the fork A is carried to the attendant's hand, and when the Skip is in the proper position the fork A is thrown under the flange B and the chain is slackened; the doors forming the bottom of the Skips then fall down and assume the position shown in the dotted lines C C, when the contents of the Skip are instantaneously discharged. When the fork is drawn back, the doors (forming the bottom) close, and they will obviously remain closed so long as the Skip is suspended (unless they are purposely opened), or when it is deposited on the ground.

FOR LAYING CONCRETE UNDER WATER this apparatus is invaluable. A pair of light doors fitted to the top of the ordinary Skip convert it into a *close box*, in which the concrete is lowered undisturbed by currents to any required depth, and by this means concrete can often be put down in situations where, without such appliances, expensive "boxes" or dams would be indispensable. For this purpose a light chain or rope is used instead of the fork A: one end is made fast to the jib head, and the other end to the flange B. The length of this chain or rope is of course regulated by the depth of working, and when this depth is reached the contents of the Skip are discharged in the same way as if the fork were thrown under the flange. If the jib is "radiated" or swung at the same time as the contents are being discharged, the concrete can be levelled at any depth as well as if "trimmed" by hand.



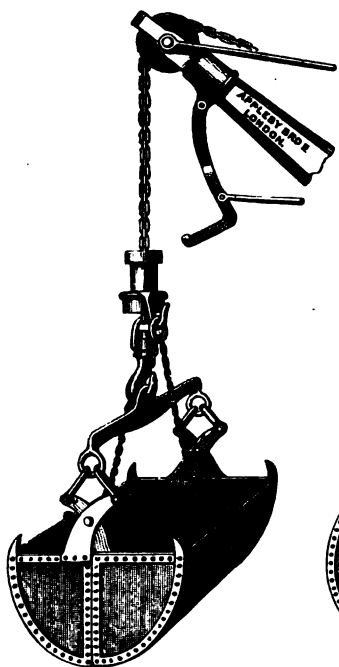
PRICES OF MURRAY'S PATENT SELF-DISCHARGING SKIPS.

To hold, cubic yards	$\frac{1}{4}$ yd.	$\frac{1}{2}$ yd.	$\frac{3}{4}$ yd.	1 yd.	1 $\frac{1}{2}$ yd.	2 yd.
Ditto, cubic feet	6 $\frac{3}{4}$ ft.	9 ft.	13 $\frac{3}{4}$ ft.	18 ft.	20 $\frac{1}{4}$ ft.	27 ft.
Ditto, cwt. of earth (about) ..	6 $\frac{1}{2}$ cwt.	8 $\frac{3}{4}$ cwt.	13 cwt.	17 $\frac{1}{4}$ cwt.	19 $\frac{1}{2}$ cwt.	26 cwt.
Price, each	£8 8s.	£9 10s.	£10 15s.	£12 15s.	£15	£18

SHIFTING HOOK and ROD for working the Skips, as shown in the engraving, £3 10s.

APPLEBY BROTHERS,

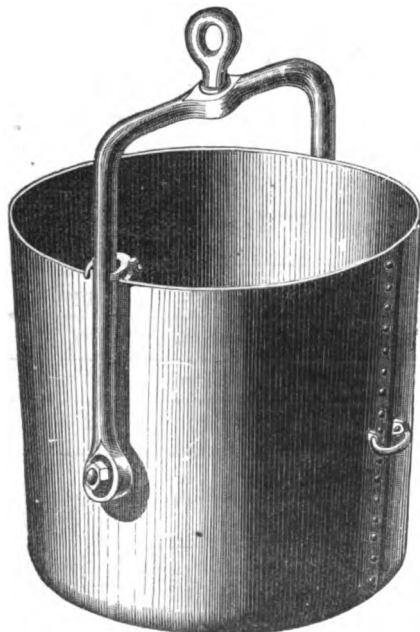
ENGINEERS, EMERSON STREET, SOUTHWARK, LONDON, S.E.



WOODFORD'S PATENT SELF-DISCHARGING SKIPS

Are of wrought iron with circular bottoms, which discharge their load when the chain is slacked out, in the same manner as described for "Murray's Patent Skips," and as here shown.

To hold, cubic yards	$\frac{1}{4}$ yd.	$\frac{1}{2}$ yd.	$\frac{3}{4}$ yd.	1 yd.	1 yd.	1 yd.
Ditto, cubic feet	6 $\frac{3}{4}$ ft.	9 ft.	13 $\frac{1}{2}$ ft.	18 ft.	20 $\frac{1}{2}$ ft.	27 ft.
Ditto, cwt. of earth (about) ..	6 $\frac{1}{2}$ cwt.	8 $\frac{3}{4}$ cwt.	13 cwt.	17 $\frac{1}{2}$ cwt.	19 $\frac{1}{2}$ cwt.	26 cwt.
Price, each	£8 8s.	£9 10s.	£10 15s.	£12 15s.	£15	£18



STRONG ROUND WROUGHT-IRON CONTRACTOR'S SKIP.

With swing handle and catch.

To hold, cubic yards	$\frac{1}{4}$ yd.	$\frac{1}{2}$ yd.	$\frac{3}{4}$ yd.
With PLAIN BALE, each ..	£4 17 6	£6 10 0	£7 10 0
With SWIVEL BALE, as shown in the Engraving, extra	0 4 0	0 5 0	0 5 0

CONTINUED.

To hold, cubic yards	$\frac{1}{4}$ yd.	$\frac{1}{2}$ yd.	1 cubic yd.
With PLAIN BALE, each ..	£9 10 0	£10 10 0	£12 10 0
With SWIVEL BALE, as shown in the Engraving, extra	0 6 0	0 7 6	0 7 6

Note.—Half a ton of small coal requires a three-quarter-yard Skip.

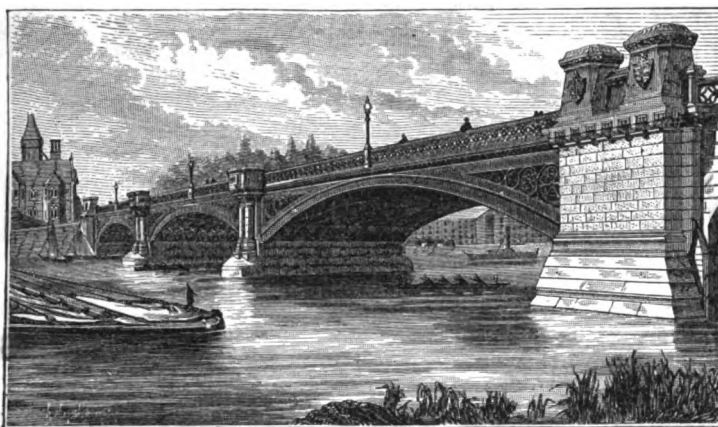
APPLEBY BROTHERS,
ENGINEERS, EMERSON STREET, SOUTHWARK, LONDON, S.E.

STRUCTURAL IRONWORK.

CAST-IRON COLUMNS.
" " STANCHIONS.
" " GIRDERS.

WROUGHT-IRON GIRDERS.
" " ROLLED JOISTS.
CAST & WROUGHT SCREW PILES.

IRON BRIDGES.
" JETTIES.
" ROOFS & BUILDINGS.



THE BRITANNIA IRON-WORKS, DERBY, have been established more than 50 years, and during the last 25 years have been continually extended and improved. During the years 1873-4 they have been doubled in extent. The Works being situated in the centre of the Iron and Coal Districts, and abutting upon the Railways and Canal, possess the greatest facilities for the Manufacture of Goods and their Delivery in all parts of the country, and to the ports for shipment.

ANDREW HANDYSIDE AND Co. (Limited) manufacture all kinds of Structures in Wrought and Cast Iron, and every year make for England and Foreign Countries many thousands of tons of Iron Girders, Landing Piers, Bridges, Roofs, and Buildings. Among the more important works constructed by ANDREW HANDYSIDE AND Co. have been the following :

AGRICULTURAL HALL, ISLINGTON.
ALBERT BRIDGE, OVER THE THAMES, LONDON.
ALEXANDRA PALACE, LONDON.
AMSTERDAM STATION, DUTCH-RHENISH RAILWAY.
BATH TERMINAL STATION, MIDLAND RAILWAY.
BROAD STREET TERMINAL STATION, NORTH LONDON RAILWAY.
CONSERVATORY, ROYAL HORTICULTURAL GARDENS, LONDON.

CZERNOWITZ BRIDGE, GALICIA.
HOOGLY FLOATING BRIDGE, CALCUTTA.
LIVERPOOL TERMINAL STATION, MIDLAND RAILWAY.
MARKETS IN THE CITY OF MADRID.
NERBUDDA BRIDGE, INDIA STATES RAILWAYS.
TRENT BRIDGE AT NOTTINGHAM.
WINTER GARDEN AT LEEDS INFIRMARY.

In addition to the above, during the last few years ANDREW HANDYSIDE AND Co. have constructed :

BRIDGES FOR AUSTRIA.
BRIDGES FOR AUSTRALIA.
BRIDGES FOR THE CAUCASUS.
BRIDGES FOR DENMARK.

BRIDGES FOR ENGLAND.
BRIDGES FOR INDIA.
BRIDGES FOR JAPAN.
BRIDGES FOR NORWAY.

BRIDGES FOR RUSSIA.
BRIDGES FOR SOUTH AMERICA.
BRIDGES FOR SWEDEN.
BRIDGES FOR TURKEY.

For more detailed particulars of Structural Ironwork see Catalogue A, forwarded free, or 'Works in Iron: Bridge and Roof Structures,' published by E. and F. N. Spon.

The Prices given on the following pages include delivery in London or to the ports for shipment.

ANDREW HANDYSIDE AND CO.,
LIMITED,

BRITANNIA IRON-WORKS, DERBY.

32, WALBROOK, LONDON.

Structural Ironwork—continued.

NOTE A.—The PRICE of Structural Ironwork is determined primarily by the current price of pig iron and rolled iron. The price of pig iron varies generally from £3 to £5. In the following prices £4 has been assumed as a basis. The price of rolled plates fluctuates from £10 to £16 per ton; bars and other forms of rolled iron having proportionate values. In the following prices £12 per ton for plates has been assumed as a basis.

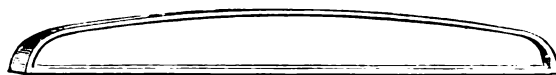
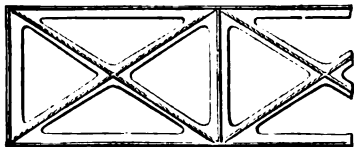


HANDYSIDE'S CAST-IRON COLUMNS.—From £8 to £12 per ton. The weight may be calculated from the thickness, which varies from $\frac{1}{2}$ inch to $\frac{3}{4}$ inch in columns of 6 inches diameter, from $\frac{3}{4}$ inch to $1\frac{1}{4}$ inch in columns of 12 inches diameter and upwards, according to the length and the load they have to carry. If of a simple kind, these prices include the cost of models. New models of elaborate character are expensive, but Andrew Handyside and Co. have a very large assortment of models in stock, as illustrated in their large Catalogue B. If Capitals of an



enriched character are required, they involve an additional cost, varying according to the amount of enrichment or elaboration. Thus the extra cost of ornamental Capitals for columns 5 inches diameter is from 3s. to 40s.; for columns 7 inches diameter, 5s. to 50s.; and for columns 10 inches diameter, from 10s. to 100s.

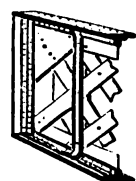
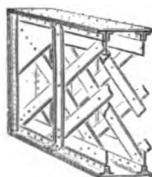
HANDYSIDE'S CAST-IRON STANCHIONS.—These are generally simpler and cheaper than columns, and cost from £8 to £10 per ton; the price per ton being generally the lowest for the heaviest patterns.



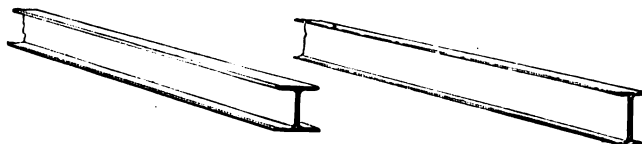
HANDYSIDE'S CAST-IRON GIRDERS.—Close Girders cost from £8 to £10 per ton. Open Trellis Girders, from £9 to £13 per ton.



HANDYSIDE'S WROUGHT-IRON GIRDERS.—There is an infinite variety of systems for Girders, and the advantages of each compare differently according to the site, the length of span, and for many other reasons. Plate Girders, Lattice, Trellis, and Warren Girders are the most usual kinds. Plate Girders cost from £17 to £21; Lattice Girders, from £19 to £23; Warren and other Girders similar in detail, £20 to £25 per ton; the exact price being determined mainly by the character of the design, the quality of the iron, and the repetition allowed. The latter point is of importance, because where numerous Girders are made alike, considerable economy may be obtained in the manufacture. The above prices are exclusive of the cost of fixing. See NOTE A, above.



HANDYSIDE'S ROLLED JOISTS.—Rolled Beams or Joists are sometimes used instead of Rivetted Girders of small depth. For small spans, or for carrying arched brick floors, or as small cross girders, or longitudinal bearers in bridges, or as rafters in iron roofs these Rolled Beams are very useful. They are usually made from 4



inches to 14 inches deep, but beyond 10 inches a Rivetted Girder is in almost all cases preferable.

The Beams cost from £12 to £14 per ton, the smallest and narrowest sections being the cheapest. These prices are for the simple Beams as they leave the rolling mill; any labour necessary for attaching them to other ironwork involving extra cost. See NOTE A, above.

ANDREW HANDYSIDE AND CO.,
LIMITED,

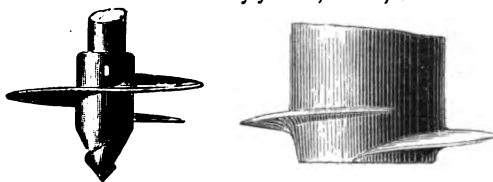
BRITANNIA IRON-WORKS, DERBY.

32, WALBROOK, LONDON.

Structural Ironwork—continued.

HANDYSIDE'S SCREW PILES.—These are used for supporting Bridges and other similar Structures, and allow Piers to be built in the water at moderate cost. Screw Piles may be made either of solid or hollow wrought iron, with cast-iron screws, or entirely of cast iron, the columns in the latter case being hollow. The form of screw depends on the strata which it has to enter, and the suitability of hollow or solid Piles depends also on other circumstances in each particular case. Hollow cast-iron Screw Piles are made of columns from 9 inches to 3 feet diameter, with Screw Blades from 1 foot to 5 feet diameter, and cost from £12 to £16 per ton. These prices include the cost of the necessary joints, bolts, &c. The form of Pile is determined by the height, the load to be carried, and the strata into which they are to penetrate.

Solid wrought-iron Piles are made from 4 inches to 9 inches diameter, and cost from £16 to £20 per ton; the expense of couplings, flanges, or other kinds of joints being incurred, as it is difficult to roll such thick pieces in any but moderate lengths. See NOTE A, p. 102.



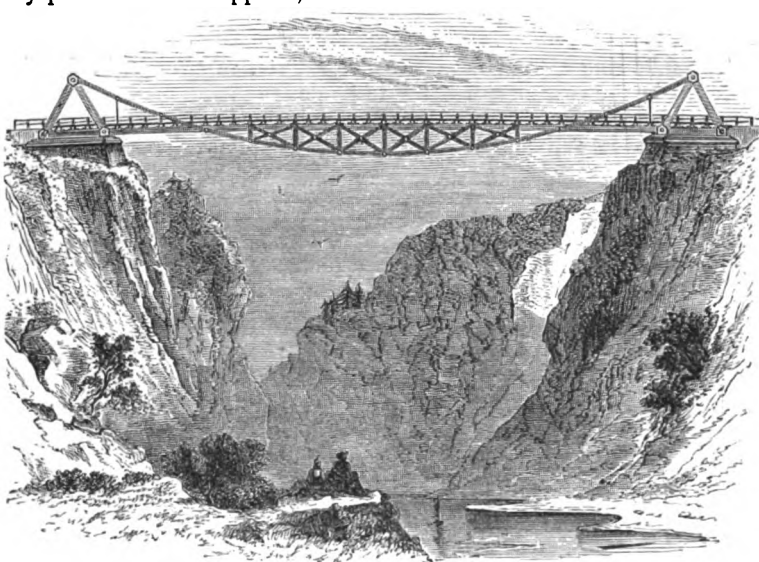
HANDYSIDE'S BRIDGES.—Where designs for Bridges and Estimates of cost are required, full information should be furnished on the following points: The Span, the width of the roadway, the material with which the roadway is to be covered, the nature of the traffic to be carried, the strata in the shores and river bed, the depth of water, the usual and flood levels, strength of current, headway required under Bridge, and other local particulars.

Cast iron is admirably adapted for Arched Bridges, and where the banks of a river allow abutments to be built at a moderate expense, such Bridges compare favourably in cost with other systems of construction. The Arched Bridge illustrated on page 101 is made of cast iron.

Wrought iron is, however, generally used for the superstructure of Bridges. The different kinds may be classed as Arched Bridges, Girder Bridges, and Suspension Bridges, and there are various systems of each. If the necessary particulars are supplied, Estimates of cost can be furnished.

ANDREW HANDYSIDE AND Co. have had a long and varied experience in the manufacture of Bridges for special situations in foreign countries, and can make designs to suit the exigencies of particular cases. Where carriage is difficult, the pieces can be arranged so as to be small and light. Where erection is difficult, as in the case of deep or rapid rivers, Bridges can be designed either for road or railway purposes which can be fixed without staging.

Handyside's Colonial Bridges are especially suitable for export, as they are light, economical, and easily fixed.



**ANDREW HANDYSIDE AND CO.,
LIMITED,**

BRITANNIA IRON-WORKS, DERBY.

32, WALBROOK, LONDON.

Structural Ironwork—continued.

HANDYSIDE'S LANDING PIERS AND JETTIES.—For making a Design and Estimate of Cost information must be furnished on the following points :



The length and width of the Jetty.

The height of the roadway from the bottom of the water. A section should be supplied, showing the slope of the ground from the shore and the depth of water at different times of tide or flood.

The nature of the sea (or river) bed. A decision as to the kind of Supports—Screw-piles, &c.—which are most

suitable, can only be arrived at when it is known whether they are to stand upon sand, rock, shingle, &c.

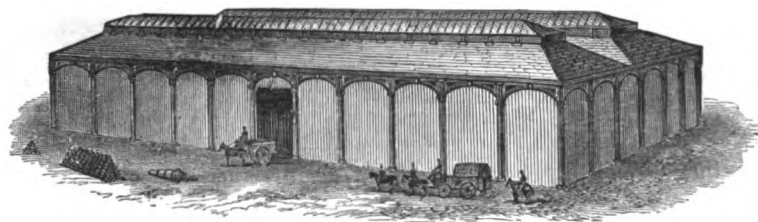
The purpose for which the Jetty is intended. If it be for the landing of goods, provision has generally to be made for the erection of cranes, and it is necessary to know where these are to be placed and the maximum weight they will lift. The weight of any carts, locomotives, or other vehicles which may come on the Jetty should be stated. If vessels are to lie alongside the Jetty their tonnage should be stated, and it must be known also whether the vessels will be so exposed to the wind or the waves as to make them roll against the Jetty.

It is useful to know if timber is procurable for the deck or platform of the Jetty, and for fender piles and booms.

HANDYSIDE'S IRON ROOFS.—Andrew Handyside and Co. have had great and special experience in the manufacture of Iron Buildings for all parts of the world, and amongst others made by them at Derby may be enumerated the Midland Railway Stations at Bath and at Liverpool, the North London Terminal Station at Broad Street, the Amsterdam Station of the Dutch-Rhenish Railway, the Agricultural Hall, London, the Conservatory of the Royal Horticultural Gardens, London, the Winter Garden at Leeds, and the large Markets in the city of Madrid.

The following extract from Chapter XVIII. of 'Works in Iron' describes the information which is needed in the case of a building to be designed and manufactured in England from particulars sent from a foreign country. On the completeness of this information depend very largely the cost of the structure, and its suitability for the purpose required. The information required is as follows :

1. The shape and dimensions of the plan and the height of the building.
2. The purpose for which the building is intended. Beyond a width of about 40 feet, the question arises whether the roof shall be made in one or more spans, and as the cost may in some cases be considerably diminished by having the roof supported at intervals between the walls, so reducing the width of any one span, it is necessary to know if intermediate columns or walls so placed will prove an obstruction.



SHELL FOUNDRY, WOOLWICH ARSENAL.

3. It should be stated whether the Iron Roof is to be supported on iron columns or on brickwork.

4. It must be known whether the building is to be open at the sides and ends, or to be enclosed, and if the latter, whether by walls or by iron screens or glass.

**ANDREW HANDYSIDE AND CO.,
LIMITED,**

BRITANNIA IRON-WORKS, DERBY.

32, WALBROOK, LONDON.

Structural Ironwork—continued.

5. As it is sometimes cheaper and better to make a roof hipped than gabled, any reason or preference for or against either plan should be given.

6. The nature of the climate should be stated with reference to the following points: The ventilating arrangements which may be needed; the kind of roof covering most suitable; the strength of the roof for resisting heavy winds or hurricanes; the nature and amount of light required; the gutters and rain pipes necessary.

7. The designer should be informed whether the structure is to have any ornamental character, or whether cheapness is the primary consideration.

The measurement, weight, and cost for roofs and buildings are generally stated according to the superficial area occupied, and the unit adopted is the "square" of 100 superficial feet. Thus an area 10 feet $\times$ 10 feet, or an equivalent area, equals one square. The measurement for the covering of a roof is usually made on the slope of the roof, not on the horizontal area covered.

The following is a summary of the points which mainly determine the weight and cost of an Iron Roof or Building:

The weight of a roof depends primarily on *the span*, as the necessary strength increases rapidly with the distance between the supports. Thus in a trussed roof the framing for a span of 50 feet would be from 6 cwt. to 8 cwt. per square; for a span of 70 feet from 7 cwt. to 10 cwt. per square; while for a span of 100 feet the weight would be from 9 to 13 cwt. per square.

The regularity or irregularity of the space to be covered.

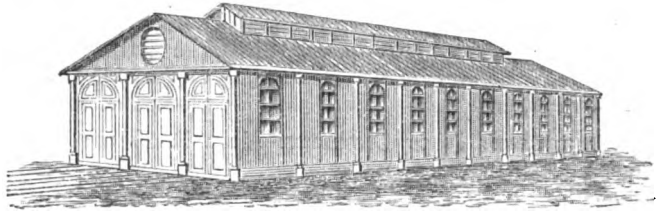
The kind of roof covering. Not only do the various kinds of covering differ in regard to cost, but the weights of the various materials differ considerably, and thus largely determine the strength necessary in the roof and the consequent weight and cost of the structure.

The amount of *repetition* allowed. A large building where the parts are similar is relatively cheaper than a small building of the same class. So also economy is obtained where several similar buildings are made at the same time with parts interchangeable.

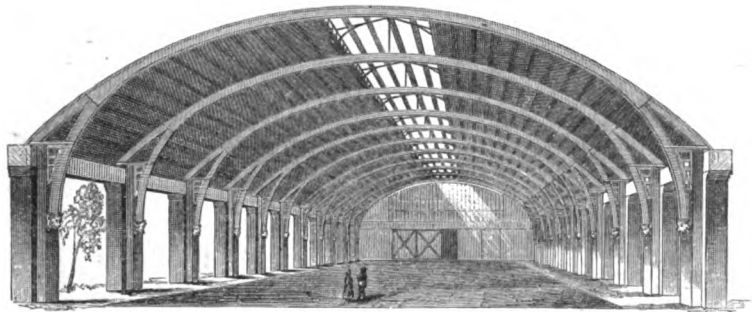
The nature of the design.

As a rule, arched roofs involve more expense than trussed roofs, because an arched roof requires abutments, while a trussed roof is complete and self-contained, only exerting a vertical pressure on the walls or columns which support it. Sometimes, however, it may be more economical to use an arched roof in cases where abutments

are provided without extra expense. Such, for instance, are cases where a building has very strong walls, or where there are side buildings which act as abutments, or where the arch springs from the ground, or, as in the case of a railway station in a cutting, where the retaining walls will be admirably suited to receive the thrust of an arched roof.



RAILWAY WAREHOUSE.



ANDREW HANDYSIDE AND CO.,
LIMITED,

BRITANNIA IRON-WORKS, DERBY.

32, WALBROOK, LONDON.

P

Structural Ironwork—continued.

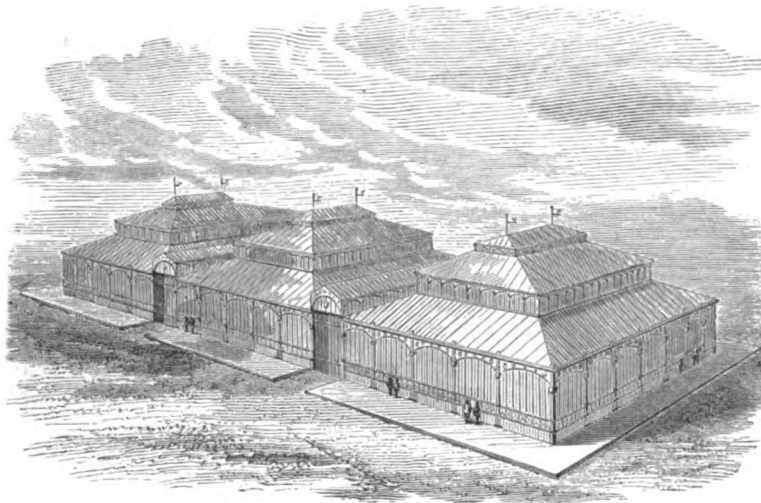
The cost per ton of iron roofing does not differ very much from that of girders, as stated on page 102, except that owing to the generally larger proportion of light pieces and smith's work, the lowest prices of girders do not apply. Thus while a range of from £17 to £25 per ton may be said to include all varieties of girders, from £19 to £26 may be said to include the different kinds of roofing. See NOTE A, page 102.

HANDYSIDE'S ROOF COVERING.—Iron Roofs may be covered with Galvanized Corrugated Iron, Zinc, Tiles, Slates, or Glass.

The iron framework of a roof having been provided, the additional cost of Galvanized Corrugated Iron (iron coated with zinc) is from £2 10s. to £5 per square of 100 superficial feet, the area being measured on the slope, and not on the dimensions of the ground covered. The above prices are based upon an assumed average value of £22 per ton for spelter (zinc), and upon the value of iron sheets when plates cost £12 per ton. The exact amount varies with the current price of spelter and the thickness of the sheets. The thickness is specified not in parts of an inch, but by the numbers of the Birmingham Wire Gauge (B. W. G.). Galvanized iron varies in thickness from 24 B. W. G. (.022 inch) to 16 B. W. G. (.065 inch). For good work in England, gauges 18 to 20 are generally used, 16 occasionally for places where great strength is required, and the thinner gauges—20 to 22—where economy is the chief consideration.

Zinc as used for roofs may be laid on the iron framing with or without boarding. The cost of zinc sheeting depends upon the current price of spelter and the shape and size of the roof. The thickness of the sheets is measured by a special zinc gauge, whose divisions approximate to those of the B. W. G. (see above), but with the numbers differently arranged. In zinc, the thickness increases with the numbers—No. 13 (.032 inch) to No. 16 (.049 inch) being generally used for roofing. Nos. 14 and 15 are those usual for good work. The cost of zinc covering ranges from £3 to £5 per square, measured on the slope of the roof.

CAST IRON IN BUILDINGS.—In the construction of Iron Buildings such as Railway Stations, Sheds, Warehouses, Markets, Conservatories, Cast Iron is generally employed for columns, gutters, spandrels, brackets, and for various small parts in the roof.



HANDYSIDE'S IRON MARKETS.—The use of iron for market buildings is becoming every year more general in England as well as in countries where other building materials are scarce. The engraving shows an Iron Market Building, erected by ANDREW HANDYSIDE AND Co., in Madrid, in 1874. Covered Sheds or Arcades cost from £18 to £25 per square (one square equals 100 superficial feet). Markets entirely enclosed cost from £25 to £45 per square, according to the span, height, ornament, &c. The above prices include the cost of

covering, but not the cost of excavation, foundations, masonry, or the erection of the market on the site. The erection costs approximately 10 per cent. on the purchase money.

ANDREW HANDYSIDE AND CO.,
LIMITED,

BRITANNIA IRON-WORKS, DERBY.

32, WALBROOK, LONDON.

MALLEABLE IRON CASTINGS.

ANDREW HANDYSIDE AND CO. (Limited) have lately erected a large new Foundry and Annealing Furnaces for the production of Malleable Iron Castings in any quantity. Malleable Castings may be substituted with advantage in many cases for Wrought Iron and Cast Steel. Prices on application.

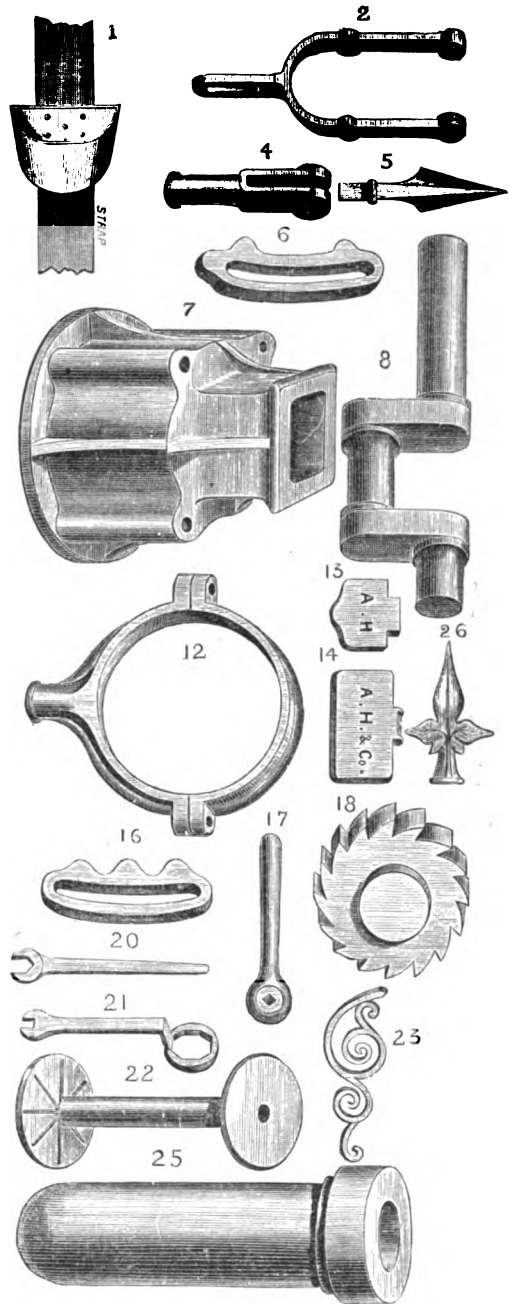
These Castings may be bent, hammered, and twisted without fracture, and can without risk be exposed to concussion, torsion, or other sudden strains, which could not be endured by ordinary Cast Iron. The fact that they can be run, when fluid, into small and intricate moulds, renders these annealed Castings valuable for many situations where forged Wrought Iron would either be very expensive or altogether impossible to deal with. In a Steam Engine or other Machine there are many small parts which are subject to such sudden shocks and torsion that Cast Iron must be of extreme thickness to endure them, while, at the same time, these parts do not require all the ductility and elasticity of Wrought Iron. It is in these cases that Malleable Castings are valuable.

The Engraving illustrates some of the uses to which, as referred to above, Malleable Cast Iron may be applied. Cross-heads, Links, Eccentric Straps, small Cranks, Locomotive Axle-Boxes, Buffer Cylinders, Axle-Box Lids, Pinions, Worm Wheels, Spanners—are all cases where something tougher than ordinary Cast Iron is needed, and where the expense of Wrought Iron may be avoided.

Malleable Cast Iron may also often be substituted with advantage for copper and brass, both as regards its strength and its good wearing properties, which render it especially suitable for clutches, eccentric straps, &c. It is impossible to enumerate all their uses, but there is hardly any kind of Machine in which Malleable Castings may not be used with advantage.

The attention of Engineers has been much directed to the use of *Cast Steel* for machinery and structural purposes; but it is found difficult to get sound, strong Castings, except in simple shapes that can afterwards be rolled or hammered. In many such cases Malleable Cast Iron will, to a very considerable extent, supply the place of Steel, as, owing to the chemical changes that take place during manufacture, the Malleable Cast Iron becomes almost as soft Steel.

Prices vary from 3½d. to 5d. per lb. according to the size, shape, and quantity ordered.



ANDREW HANDYSIDE AND CO.,
LIMITED,

BRITANNIA IRON-WORKS, DERBY.

32, WALBROOK, LONDON.

P 2

ORNAMENTAL IRONWORK.

As an addition to their old-established Foundry for Heavy and General Castings, ANDREW HANDYSIDE AND CO. (Limited) have recently built one of the largest Foundries in England for Light and Ornamental Castings. From their very large stock, A. H. and Co. have selected about 1500 of the most useful designs, and have catalogued them. The designs are carefully drawn to scale, and are neatly lithographed. The dimensions of each design are placed against it, and each is numbered for reference.

The Catalogues are divided into Sections as follows :

Catalogue B.

I.—RAILINGS AND GATES.

II.—LAMP PILLARS AND LAMP BRACKETS.

III.—BALUSTERS, CRESTINGS, AND TERMINALS.

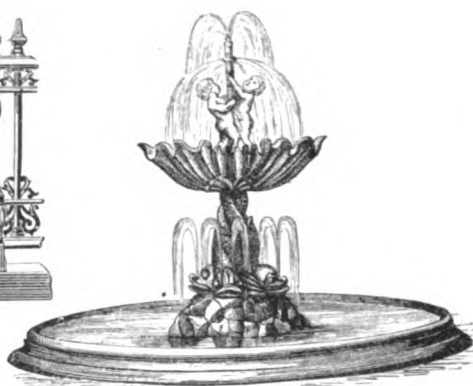
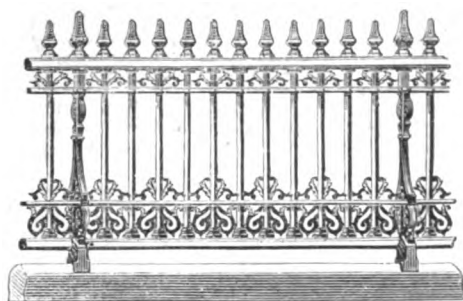
IV.—PANELS, ROSETTES, AND GRATINGS.

V.—BRACKETS, COLUMNS, AND COLUMN CAPITALS.

VI.—WINDOWS AND CASEMENTS.

VII.—CONSERVATORIES AND BAND STANDS.

Catalogue C.—VASES, FOUNTAINS, AND DRINKING FOUNTAINS.



ANDREW HANDYSIDE AND CO.,
LIMITED,

BRITANNIA IRON-WORKS, DERBY.

32, WALBROOK, LONDON.

SMITHS' HEARTHES.

ANDREW HANDYSIDE AND Co. have for many years made a speciality of the manufacture of SMITHS' HEARTHES, and make them of all sorts and sizes for every kind of Smiths' work.

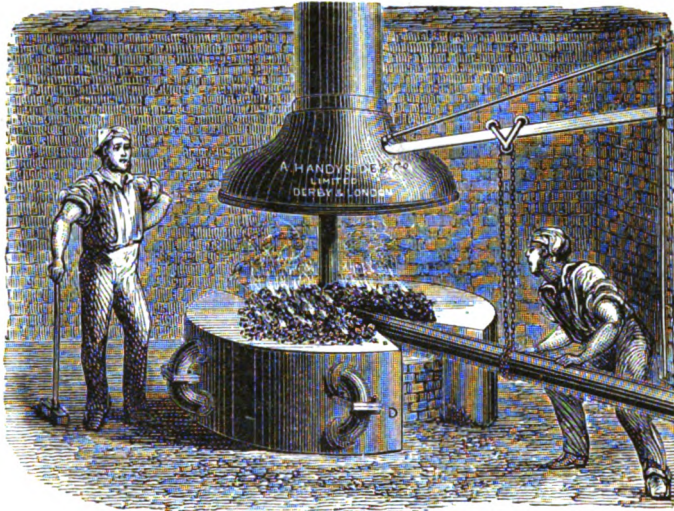
The Smithies of the Royal Small Arms Factory at Enfield are fitted with Handyside's Hearths, and they are also used at the Royal Arsenal, Woolwich, and by many of the principal Engineers in England and abroad.

Purchasers are supplied with full particulars about the Blast, the Fan, the Blower, the Tuyere, Blast Pipes, Smoke Pipes, and other useful information concerning the arrangement of a Smithy.

No. 1.—An Annular Hearth, cast in one piece. It is divided into an upper and lower chamber. The branch pipe is connected to the main blast-pipe under ground, and the blast passing into a chamber is taken by three tuyeres into the fire. The upper chamber is kept full of water for the constant supply of the tuyeres, and the water also keeps cool the inner surface of the Hearth, and protects it from the action of the fire.

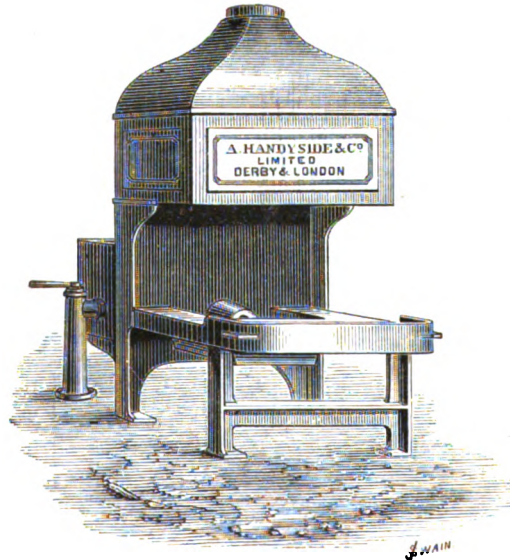
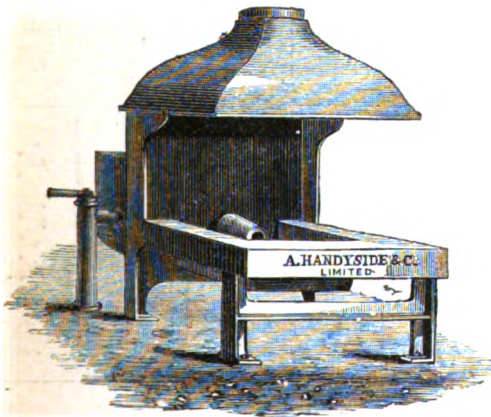
Nos. 2 and 5.—These Hearths are adapted for the larger forgings in an Engineer's factory. The plate is 4 feet by 3 feet 9 inches, and all are large in proportion. The back plate can be lined with fire bricks. Besides the water cistern for the tuyere, there is in No. 2 Hearth a double cistern in front, one compartment 10 inches wide, for a slack trough, and the other 13 inches wide, for fuel. A screen to the hood and movable bracket to the fire plate are included.

No. 1.



Nos. 3, 4, and 6.

Nos. 2 and 5.



ANDREW HANDYSIDE AND CO.,
LIMITED,

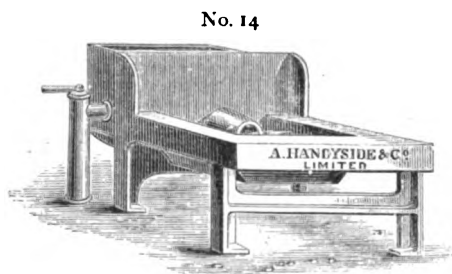
BRITANNIA IRON-WORKS, DERBY.

32, WALBROOK, LONDON.

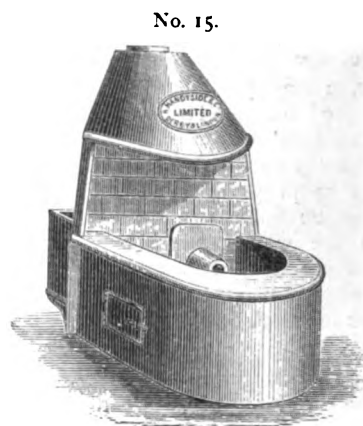
SMITHS' HEARTHS.

Nos. 3, 4, and 6.—In these Hearths the hood or bonnet is raised and the space so gained is enclosed by a square case which should be lined with fire brick. This arrangement reduces the radiation of heat, and by improving the draught prevents smoke in the Smithy. A screen to the hood and movable bracket to the fire plate are included.

No. 14.—This Hearth is designed for ship-builders, bridge-builders, and others, who have rough work in the open yard, where a strong, cheap Hearth is required. The plate measures 3 feet 6 inches by 3 feet 6 inches, and the Hearth somewhat resembles No. 5, without the hood. Weight, about 10 cwt.



No. 15.—This Hearth is specially designed for chain makers, whose heavy work would break an ordinary iron hearth, and renders frequent repairs necessary in a brick hearth.



No.	Size of Hearth Plate.	Price without Fire Bricks.		Fire Bricks extra.	Stand Pipe extra.	Approximate weight of Hearth.	Approximate weight of Fire Bricks.	Diam. of Smoke Pipe required.
		Fitted with Water Tuyere.	Fitted with Patent Tuyeres.					
		£ s. d.	£ s. d.			cwt.	cwt.	
1	5' 0" diam.	37 0 0	.. ..	..	..	30	..	..
2	3' 9" x 4' 0"	22 0 0	20 5 0	19/	36/	21	5	12"
3	3' 9" " 4' 0"	22 0 0	20 5 0	28/	36/	22	7	12"
4	4' 0" " 3' 6"	20 10 0	19 5 0	32/	36/	19	6	10"
5	4' 0" " 3' 6"	17 5 0	16 0 0	15/	36/	16	5	10"
6	3' 6" " 2' 8"	15 0 0	13 15 0	23/	36/	13	4	9"
7	3' 6" " 2' 7"	17 0 0	16 0 0	27/	36/	17	7½	9"
8	2' 6" diam.	13 5 0	13 10 0	26/	36/	14	6	9"
9	1' 9" " "	6 0 0	6 5 0	..	..	5	..	7"
14	..	9 17 6	..	..	36/	10	..	..
15	..	26 10 0	..	30/	36/	18	6	..

ANDREW HANDYSIDE AND CO.,

LIMITED,

BRITANNIA IRON-WORKS, DERBY.

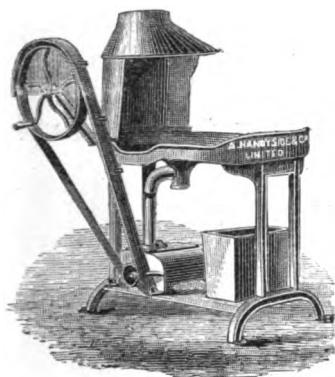
32, WALBROOK, LONDON.

PORTABLE FORGES.

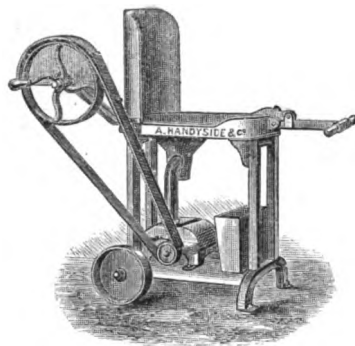
These Forges differ from those hitherto used in England, and present several new features. The essential part of any Smith's hearth or forge is the *Blast*, and the usual plan of producing the blast by bellows is open to many objections. The bellows is liable to be burnt, cut, or otherwise damaged; and once in such a condition the forge is useless. Although the bellows is often enclosed in a box, the above objections remain.

Hitherto, in the effort to reduce the Portable Forge to such limits as to make it portable, the bellows has been so diminished, and the blast and heating capacity so reduced, as to be of little value for practical purposes. The only alternative to the bellows has till lately been the *Fan*, which is entirely inapplicable to a Portable or Self-contained Forge, because of the very high speed and the consequent power which is required to produce the blast.

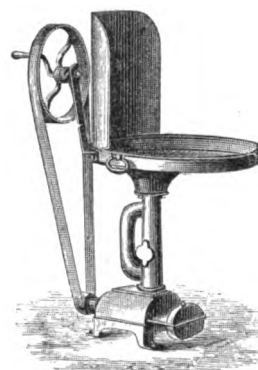
No. 11.



No. 12.



No. 13.



These Portable Forges are believed to be superior to any others in use. They occupy but little room, are convenient in all their arrangements, are operated with little power, and possess *great heating capacity*. For the ease and readiness with which a strong blast is obtained, the bellows is not to be compared to the Blower. Although slightly heavier than the sheet-iron forges with bellows, these Forges are much stronger, and form useful and permanent Hearths. The parts are few in number, and are all made of cast iron, as light as is consistent with strength.

The Forges are complete in themselves, do not require to be fastened to the ground, and can be set to work directly.

No.	Size of Hearth Plate.	Price.			Travelling Wheels extra.	Approximate weight.
		£	s.	d.		cwt.
10	3' 4" x 2' 2"	17	10	0	15/	5½
11	2' 6" „ 1' 9"	12	10	0	15/	3½
12	1' 8" „ 1' 2"	9	2	6	..	2½
13	1' 9" „ 1' 3"	8	0	0	..	1½

No. 12 is always mounted on wheels, which are included in the price. No. 13 does not require wheels.

ANDREW HANDYSIDE AND CO.,
LIMITED,

BRITANNIA IRON-WORKS, DERBY.

32, WALBROOK, LONDON.

STEAM AND HYDRAULIC MACHINERY.

DAVEY'S PATENT DIFFERENTIAL PUMPING ENGINE.

DAVEY'S DIFFERENTIAL HYDRAULIC ENGINE.

HYDRAULIC RAMS FOR RAISING WATER.

HYDRAULIC HOISTS. HYDRAULIC ORGAN-BLOWERS.

The Differential Steam-Pump.

ROTATIVE STEAM-PUMPS, FOR BOILER FEEDING AND GENERAL PURPOSES.

COMPOUND ROTATIVE STEAM-ENGINES.

THE SEPARATE CONDENSER.

DIFFERENTIAL CORNISH PUMPING ENGINES.

DIFFERENTIAL BLOWING ENGINES.

HAULING ENGINES WORKED BY STEAM, WATER, OR COMPRESSED AIR.

All kinds of Pumping and Winding Machinery, &c., &c., &c.

CATALOGUES ON APPLICATION.

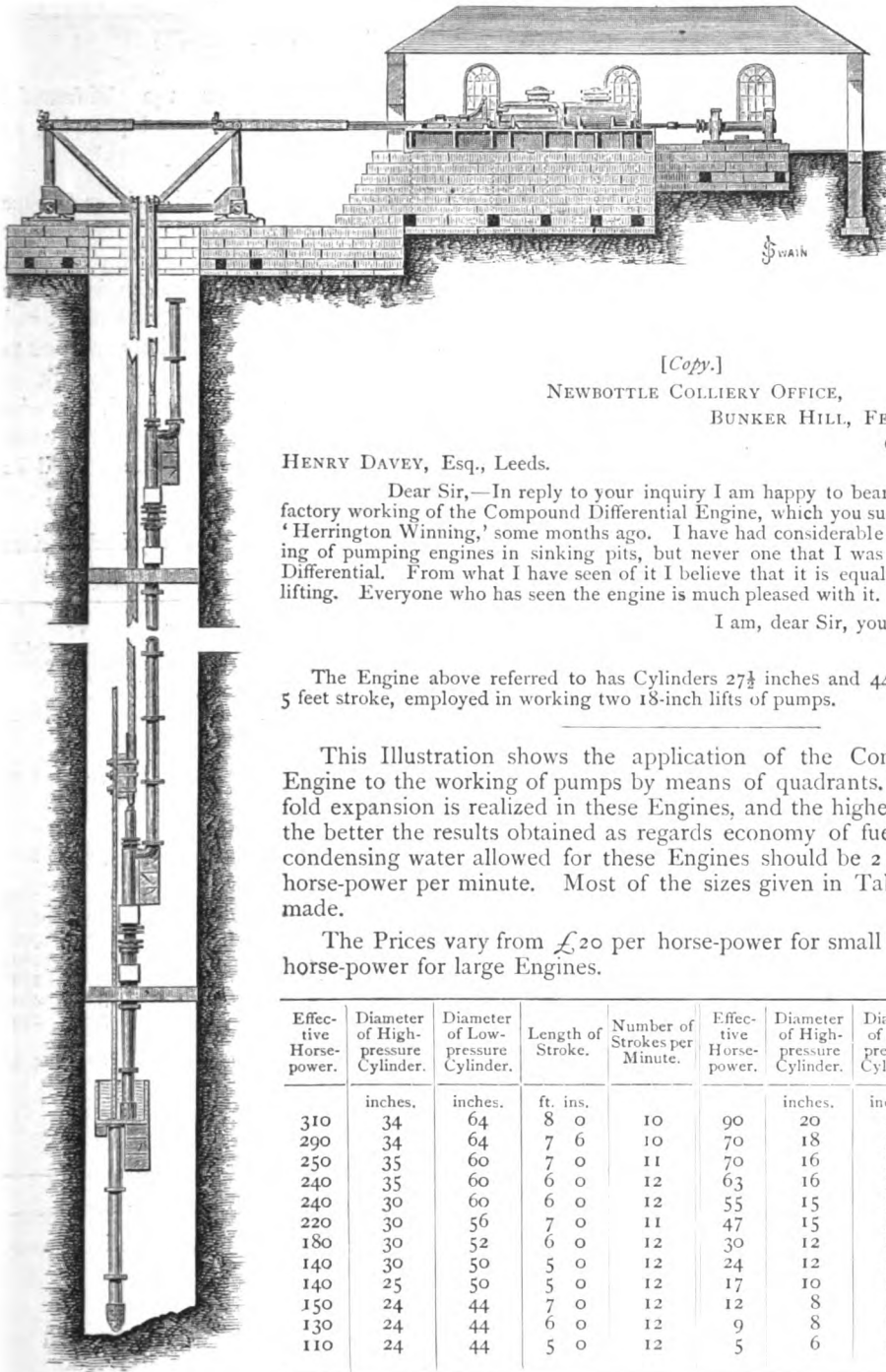
FOR PARTICULARS SEE FOLLOWING PAGES.

HATHORN DAVIS, CAMPBELL, AND DAVEY,
ENGINEERS, SUN FOUNDRY, LEEDS, ENGLAND.

LONDON OFFICE :

4, WESTMINSTER CHAMBERS,
WESTMINSTER, S.W.

COMPOUND DIFFERENTIAL ENGINE.



[Copy.]

NEWBOTTLE COLLIERY OFFICE,
BUNKER HILL, FENCE HOUSES,
6th January, 1875.

HENRY DAVEY, Esq., Leeds.

Dear Sir,—In reply to your inquiry I am happy to bear testimony to the satisfactory working of the Compound Differential Engine, which you supplied to Earl Durham's 'Herrington Winning,' some months ago. I have had considerable experience in the working of pumping engines in sinking pits, but never one that I was so satisfied with as the Differential. From what I have seen of it I believe that it is equally suitable for forcing or lifting. Everyone who has seen the engine is much pleased with it.

I am, dear Sir, yours truly,

W. LISHMAN.

The Engine above referred to has Cylinders $27\frac{1}{2}$ inches and 44 inches in diameter by 5 feet stroke, employed in working two 18-inch lifts of pumps.

This Illustration shows the application of the Compound Differential Engine to the working of pumps by means of quadrants. From four to ten fold expansion is realized in these Engines, and the higher the boiler pressure the better the results obtained as regards economy of fuel. The quantity of condensing water allowed for these Engines should be 2 gallons per effective horse-power per minute. Most of the sizes given in Table below have been made.

The Prices vary from £20 per horse-power for small Engines to £10 per horse-power for large Engines.

Effective Horse-power.	Diameter of High-pressure Cylinder.	Diameter of Low-pressure Cylinder.	Length of Stroke.	Number of Strokes per Minute.	Effective Horse-power.	Diameter of High-pressure Cylinder.	Diameter of Low-pressure Cylinder.	Length of Stroke.	Number of Strokes per Minute.
	inches.	inches.	ft. ins.			inches.	inches.	ft. ins.	
310	34	64	8 0	10	90	20	40	5 0	12
290	34	64	7 6	10	70	18	36	5 0	12
250	35	60	7 0	11	70	16	32	6 0	12
240	35	60	6 0	12	63	16	32	5 0	13
240	30	60	6 0	12	55	15	30	5 0	13
220	30	56	7 0	11	47	15	30	4 0	14
180	30	52	6 0	12	30	12	24	4 0	14
140	30	50	5 0	12	24	12	24	3 0	15
140	25	50	5 0	12	17	10	20	3 0	15
150	24	44	7 0	12	12	8	16	3 0	15
130	24	44	6 0	12	9	8	16	2 6	15
110	24	44	5 0	12	5	6	12	2 6	15

HATHORN DAVIS, CAMPBELL, AND DAVEY,
ENGINEERS, SUN FOUNDRY, LEEDS, ENGLAND. LONDON OFFICE: 4, WESTMINSTER
CHAMBERS, WESTMINSTER, S.W.

Q

COMPOUND DIFFERENTIAL PUMPING ENGINE AND PUMPS.

(DAVEY'S PATENT.)

The Illustration represents the Differential Engine as applied for underground pumping as described in outline of "Davey's System."

These Engines are provided with either Surface or Injection Condensers, and are so designed that Pumps of any size can be fixed to them provided the strokes are the same as the Engine. The Pumps are of the Double-acting Ram variety, and though much more costly, are infinitely superior to the Piston Pumps, not being affected by grit or sand in the water. For permanent work it is wise to have gun-metal Rams. Two gallons of water per effective horse-power per minute should be allowed for condensing.

The following Table contains the principal sizes made :

Effective Horse-power.	Diam. of High-pressure Cylin.	Diam. of Low-pressure Cylin.	Length of Stroke.	No. of Strokes per Minute.	Diam. of Pump Ram.	No. of Gallons raised per min.	Height of Lift.
	inches.	inches.	ft. in.		inches.		feet.
290	34	64	7 6	10			
250	35	60	7 0	11			
240	35	60	6 0	12	12½	700	910
240	30	60	6 0	12			
220	30	56	7 0	11			
180	30	52	6 0	12			
140	30	50	5 0	12	12	500	800
140	25	50	5 0	12			
130	24	44	6 0	12	11½	560	700
110	24	44	5 0	12	11½	500	600
90	20	40	5 0	12	9	300	700
70	18	36	5 0	12	17	1000	180
63	16	32	5 0	12	17	1000	150
55	15	30	5 0	12	9	300	400
47	15	30	4 0	14	12½	520	240
30	12	24	4 0	14			
24	12	24	3 0	15	6	100	400
17	10	20	3 0	15			
12	8	16	3 0	15			
9	8	16	2 6	15			
5	6	12	2 6	15			

Prices vary from £12 per effective horse-power for the large Engines to £25 per effective horse-power for small ones.

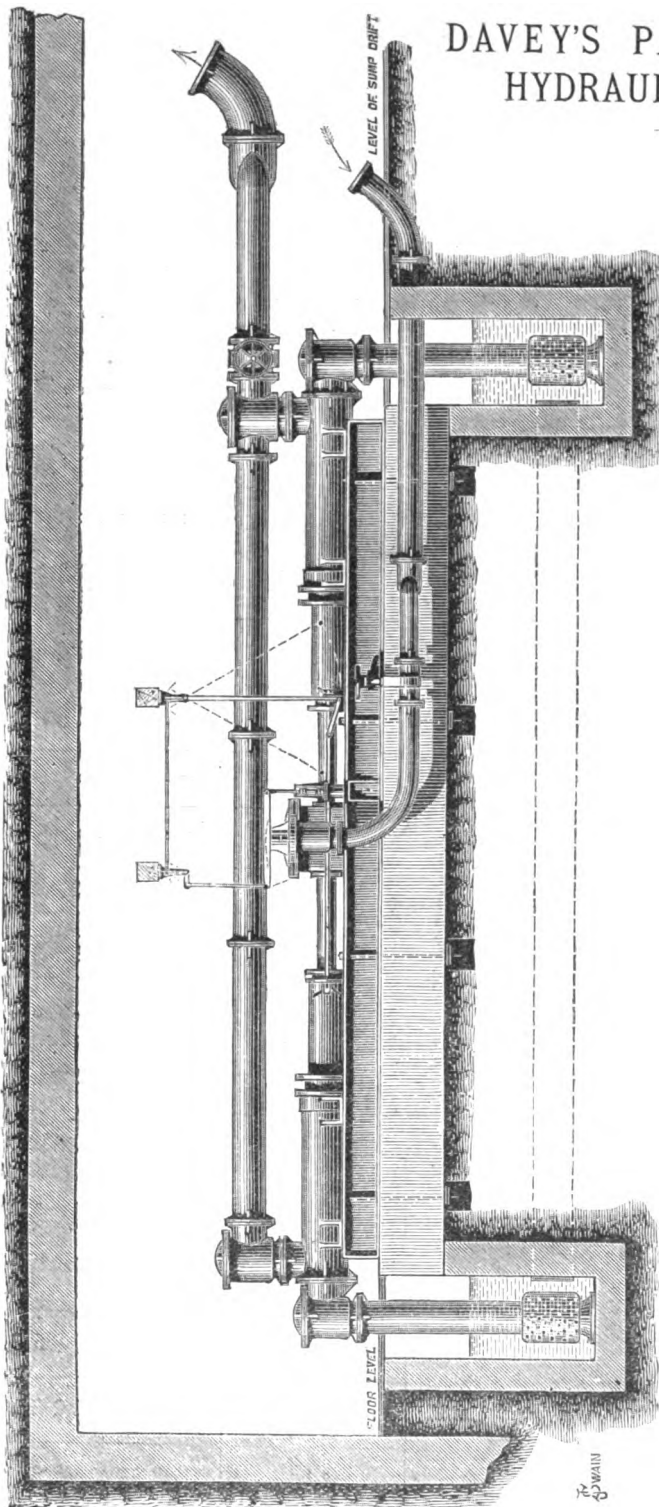
HATHORN DAVIS, CAMPBELL, AND DAVEY,
ENGINEERS,
SUN FOUNDRY, LEEDS, ENGLAND.

LONDON OFFICE: 4, WESTMINSTER CHAMBERS,
WESTMINSTER, S.W.

DAVEY'S PATENT DIFFERENTIAL HYDRAULIC PUMPING ENGINE.

DAVEY'S SYSTEM OF UNDERGROUND PUMP-ING FOR COLLIERIES AND MINES.

This system, which is being carried out on a large scale in a colliery 1200 feet deep, may be thus described. At a point 900 feet from the surface are placed a pair of Compound Differential Engines and Pumps (with separate Condenser, similar to that illustrated in the page immediately following). At the bottom of the pit, 300 feet below the Differential Steam Engines, are placed a pair of Hydraulic Pumping Engines (as here illustrated), and these lift a thousand gallons per minute to the main Engines. The main (Differential) Engines force the water to the surface and supply power through the column to work the Hydraulic Engines. By this system the main Engines are kept out of danger of flooding. The Hydraulic Engines will work under water and can be actuated from the main Engine Room. As further security they could be placed in a water-tight chamber, accessible from the main Engine Room through a water-tight staple. By such means the Hydraulic Engines could be under repair even when the water rose to the main Engines, 300 feet up the shaft. The Hydraulic Engine has a variety of applications, and may be worked from a natural head of water or from an Accumulator, the principle of its action being the employment of water at a given head to raise a larger quantity against a less head. In hilly mining districts water may be accumulated at a high elevation and conducted to the mine in pipes, where it could be employed in actuating one of these Engines for pumping the water from the mine; in this way the cost of Steam power may often be saved. The Hydraulic Engine is also suitable for accumulating power and transmitting it from one point to another far distant. For example, water flowing from an elevation on one side of a valley may be made to pump water to a higher elevation, either on the same or on the opposite side, where it may be stored for use or employed in giving motion to machinery, &c.



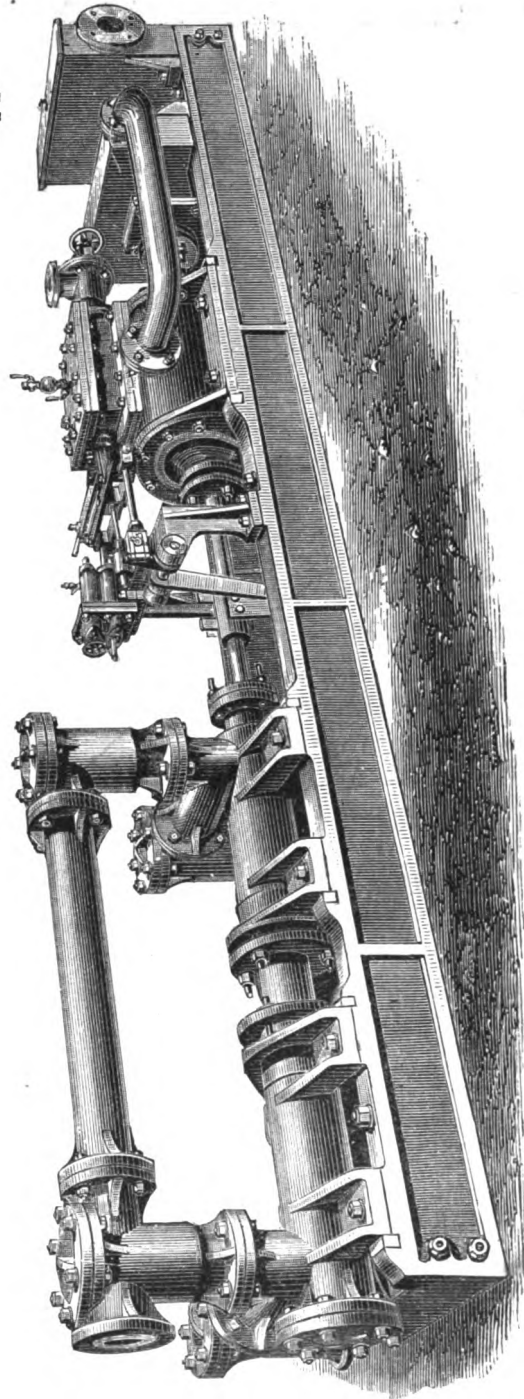
HATHORN DAVIS, CAMPBELL, AND DAVEY,
ENGINEERS, SUN FOUNDRY, LEEDS, ENGLAND. LONDON OFFICE: 4, WESTMINSTER
CHAMBERS, WESTMINSTER, S.W.

THE SINGLE-CYLINDER DIFFERENTIAL PUMPING ENGINE AND DOUBLE-RAM PUMPS.

(DAVEY'S PATENT.)

These Engines are made either Condensing or Non-condensing. Pumps of any size can be put to any of the Engines mentioned in the following Table. The quantity of condensing water required varies with the power developed, but may be approximately calculated at about 3 gallons per actual horse-power per minute.

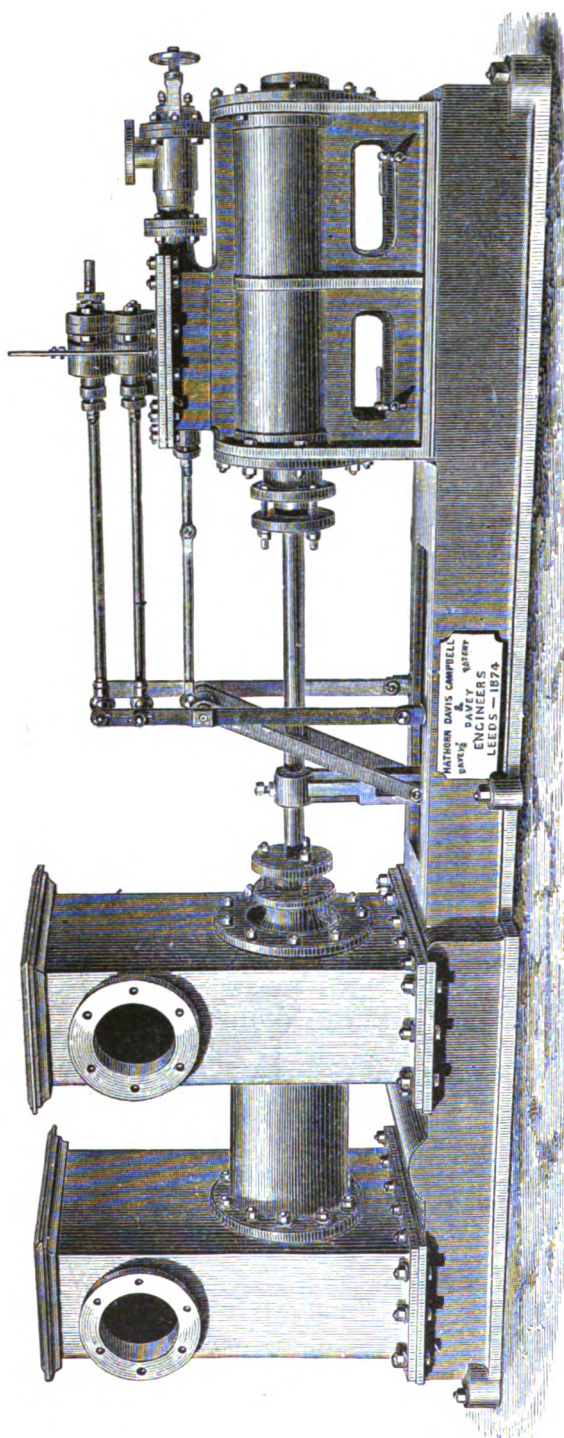
Dia. of Cyl.	Length of Stroke.	Number of Strokes per Minute.	Diameter of Pump.	Number of Gallons per Minute.	Height of Lift.
	ft. ins.		inches.		feet.
12	1 8	20	6	90	250
12	1 8	20	6		
12	3 0	15	8		
14	2 0	20	6		
14	2 0	20	8		
14	3 0	15	9		
16	2 0	20	8½	200	135
16	3 0	15	10		
18	2 0	20	11		
18	3 0	15	10		
18	4 0	13			
20	2 0	20			
20	3 0	15	4½	58	1000
20	4 0	13		160	400
22	2 0	20	8		
22	3 0	15			
22	4 0	13			
26	3 0	15	12½	450	240
26	4 0	13		230	480
28	4 0	13			
28	5 0	12			
30	3 0	15	9		
30	4 0	13			
35	5 0	12		300 & 500	700 & 500
40	5 0	12			
52	5 0	12	9½ & 11½		



HATHORN DAVIS, CAMPBELL, AND DAVEY,
ENGINEERS, SUN FOUNDRY, LEEDS, ENGLAND. LONDON OFFICE: 4, WESTMINSTER
CHAMBERS, WESTMINSTER, S.W.

THE SEPARATE CONDENSER.

(DAVEY'S PATENT.)



This Condenser has been designed to meet the want felt at the present time for a Condenser capable of being easily applied to existing non-condensing engines, to economize fuel and to increase the power. By its application from 30 to 40 per cent. increased power is available, and from 30 to 40 per cent. of fuel is saved.

The Air Pump of the Separate Condenser is worked by means of a small Differential Steam-Engine. In applying the Condenser to an existing engine all that is necessary is to fix it in any convenient place and lead the exhaust and a small steam pipe to it.

For Winding Engines the Separate Condenser is invaluable, because the vacuum is not at all impaired by the repeated stopping of the engine. When this Condenser is applied to engines situated underground in mines, a hydraulic engine is sometimes used to work the Air Pump, the power being obtained from the column or the tubing.

The advantages claimed for this Condenser are :

1st.—*Economy of Fuel and Increase of Power.* The additional average pressure available on the piston of the engine by the use of the Separate Condenser may be taken as 12 lb. per square inch, consequently, if the engine is not required to do additional work the average steam pressure may be reduced 12 lbs. This, in cases where the average steam pressure is not high, would represent a saving of 40 per cent. of steam, and in the majority of cases the saving would much exceed 30 per cent.

2nd.—The vacuum is maintained unimpaired when the engine is irregular in its working and when it ceases to work, which makes it peculiarly advantageous for winding engines.

3rd.—One Condenser may be made to condense the steam for several independent engines.

4th.—The Condenser being entirely distinct from the engine, it is more accessible, is easier managed, and in the case of requiring repairs it does not prevent the engine being worked as a non-condensing engine.

5th.—A Boiler-feed Pump may be combined with the Separate Condenser, arranged to feed the boilers from the hot well.

In writing for estimates the following particulars of the engine or engines to which the Condenser is to be applied should be stated, viz. :

Number of Cylinders	.. .. .
Diameter of Cylinders	.. .. .
Length of Stroke	.. .. .
Greatest number of Strokes per minute	..
Average pressure of Steam during the Stroke	..
Type of Condenser, <i>Surface or Injection</i>	..
Is the Condenser required to increase the power of the Engine or to economize fuel?	

HATHORN DAVIS, CAMPBELL, AND DAVEY,
ENGINEERS, SUN FOUNDRY, LEEDS, ENGLAND. LONDON OFFICE : 4, WESTMINSTER
CHAMBERS, WESTMINSTER, S.W.

RAG ENGINES,

FOR WASHING, BLEACHING, AND BEATING.

Bentley and Jackson have Patterns for the following Sizes :

Length.			Width.		Depths.				ROLL.			
					Deep end.		Shallow end.		Diameter.		Length on face.	
feet.	inches.		feet.	inches.	feet.	inches.	feet.	inches.	feet.	inches.	feet.	inches.
The Troughs are made in one casting or in parts.	10	0	5	0	1	11	1	7½	2	8	2	3
	11	6	5	10	2	0½	1	10	3	0	2	9
	13	0	6	3	2	3½	1	11½	3	3	3	0
	13	0	6	3	2	3½	1	11½	4	0	3	0
	13	6	7	0	2	3½	1	11½	4	0	3	6
The Troughs are in parts.	14	6	7	3	2	9	2	3½	3	6	3	6
	16	0	8	0	2	9	2	4½	4	6	4	0
	19	0	9	3	2	9	2	4½	4	6	4	6
	27	0	13	0	2	9	2	4½	5	3	6	6

The diameters of the Rolls can be altered if desired.

STEEL ROLLER BARS AND PLATES FOR RAG ENGINES. RAG CHOPPER KNIVES, STEEL DOCTORS.

HYDRAULIC PRESSES AND PUMPS.

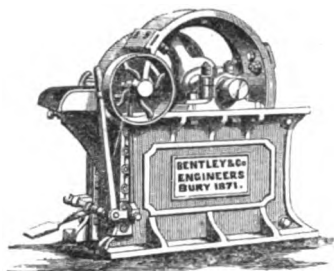
Millwrights' Work. Gearing, Shafting, &c.

MACHINE-MADE SPUR AND BEVEL WHEELS.

HORIZONTAL HIGH-PRESSURE AND CONDENSING STEAM ENGINES.

PRICES ON APPLICATION.

BENTLEY AND JACKSON,
ENGINEERS, MILLWRIGHTS, AND IRON AND BRASS FOUNDERS,
BURY, NEAR MANCHESTER.



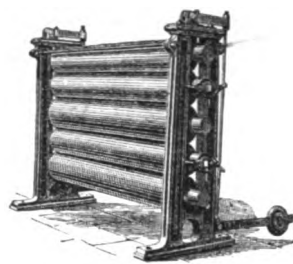
ROPE AND RAG CHOPPER.
Wheel, 4 feet diameter, 1 foot wide.

PAPER-MAKING MACHINES.

MILLBOARD MACHINES.

DRYING CYLINDERS, UP TO
9 FEET IN DIAMETER.

CONTINUOUS PAPER-CUTTING
MACHINES.



FINISHING CALENDER.

PATENT GUILLOTINE CUTTING MACHINES.

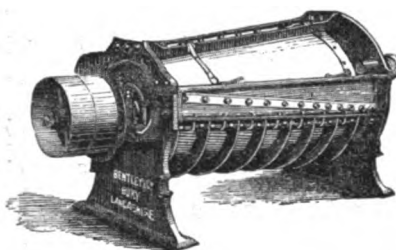
RAG DUSTERS, RAG AND ROPE CHOPPERS.

CONICAL WILLOWS.

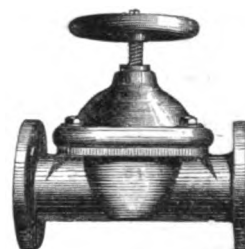
CYLINDRICAL AND SPHERICAL REVOLVING RAG-BOILERS,
TO CONTAIN FROM 20 CWT. TO 50 CWT. OF RAGS.



WATER VALVE.



CONICAL WILLOW, for extracting Shive
from Hemp, and dirt from other fibrous material.



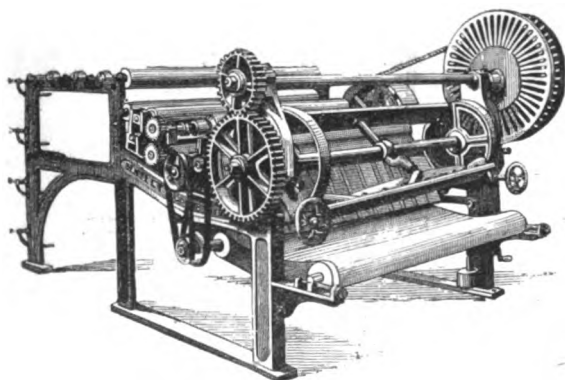
WATER VALVE.

VOMITING KIERS. STEAM AND WATER VALVES.

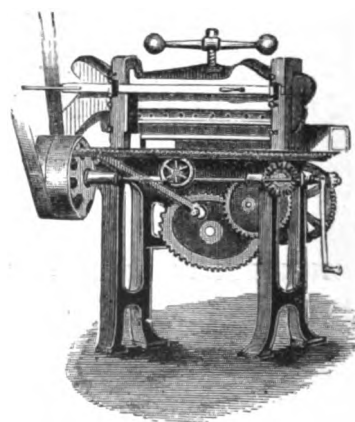
FRICTION AND REVERSING CALENDERS, BRASS AND COPPER ROLLERS.

RIPPING AND WINDING MACHINES,

TO PREPARE PAPER FOR THE WALTER, HOE, AND OTHER CONTINUOUS WEB PRINTING PRESSES.



DETACHED PAPER-CUTTING MACHINE.



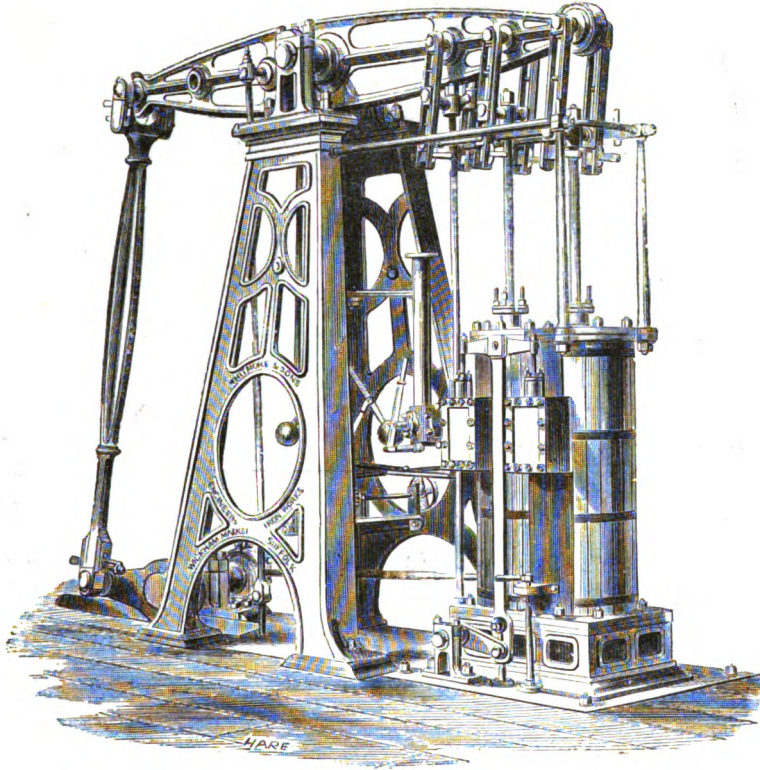
32-IN. GUILLOTINE CUTTING MACHINE.

BENTLEY AND JACKSON,

PAPER-MAKERS' ENGINEERS, BURY, NEAR MANCHESTER.

DOUBLE-CYLINDER BEAM ENGINES.

CONSTRUCTED WITH INDEPENDENT FRAMEWORK OR OTHERWISE.



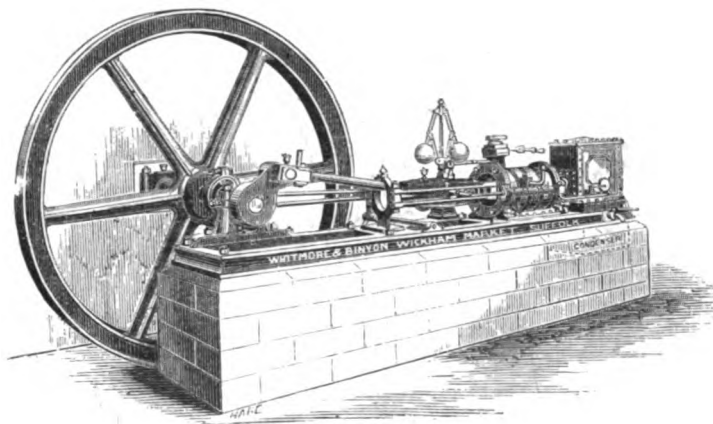
The above Engraving represents one of WHITMORE AND BINYON'S High and Low Pressure Condensing and Independent Beam Engines. These Engines are erected on a strong metal bed-plate, made suitable for securing to Masonry. The two Cylinders are in one casting, are mounted upon an iron panelled basement, and are covered with patent felt, cased with mahogany, and secured by brass bands. The cast-iron framework comprises strong angular frames. The piston, parallel motions, pumps, condensing apparatus, governors, &c., &c., are all constructed with the best material, and by the most skilled workmen. These Engines are also fitted with massive fly-wheels, suitable for Mill Machinery.

WHITMORE AND BINYON,
ENGINEERS, MILLWRIGHTS, AND BOILER MAKERS,
IRON WORKS, WICKHAM MARKET, SUFFOLK (ESTABLISHED 1780).
LONDON OFFICE : 28, MARK LANE.

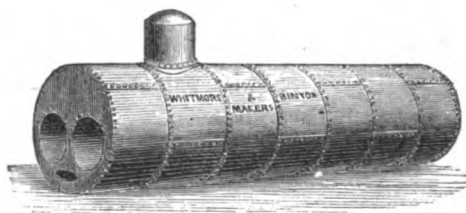
R

STATIONARY HORIZONTAL STEAM-ENGINES AND BOILERS.

Pages in Catalogue, 9 and 10.



HORSE POWER	4	6	8	10	12	14	16	20	25
Price of Engine only	£ 82	£ 107	£ 128	£ 155	£ 194	£ 225	£ 249	£ 308	£ 380
„ Cornish Boiler only	63	83	112	135	141	155	181	227	275
„ Complete with Engine and Connections	145	190	240	290	335	380	430	535	655
„ Multitubular Boiler only	74	103	136	163	173	193	222	267	325
„ Complete with Engine and Connections	157	210	265	318	366	418	472	576	705
„ Extra if with Condenser	30	34	39	41	43	49	55	66	73
„ Extra if with Expansion Valve	10	10	10	10	15	15	15	Free	Free
„ Extra if with Water Heater	10	10	10	10	15	15	15	15	15

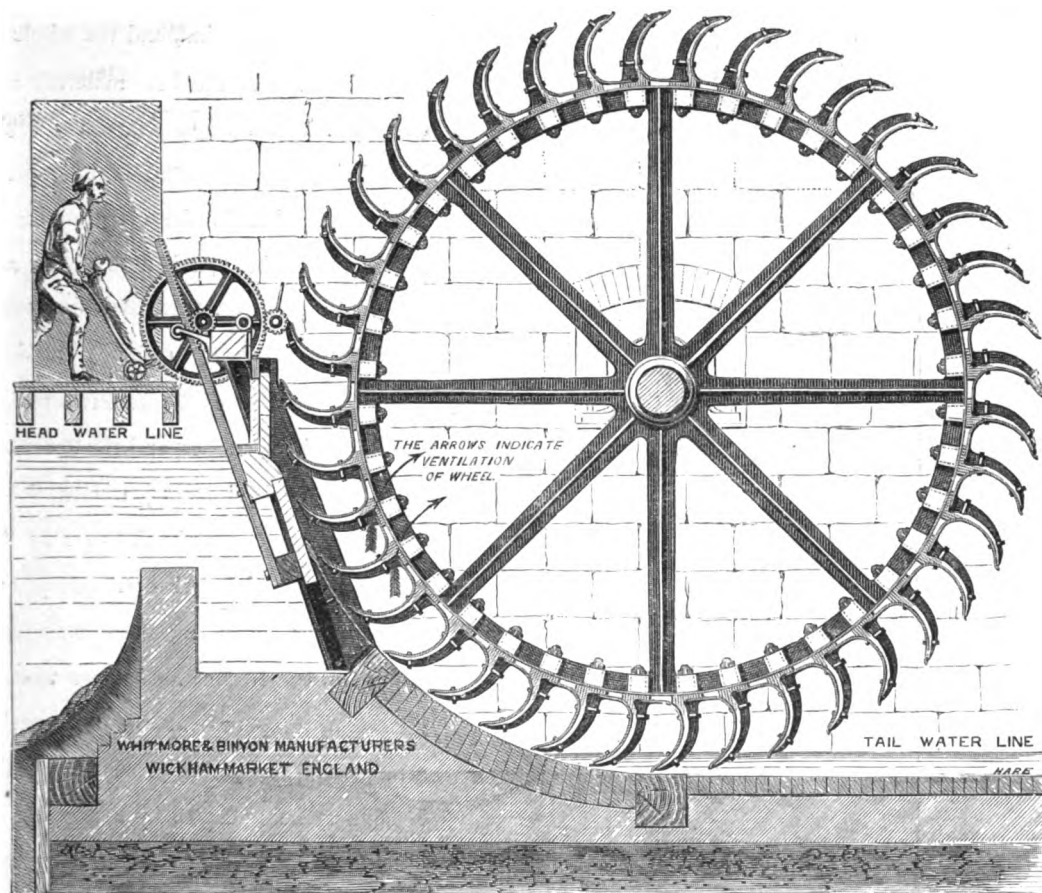


W. and B. are extensive Manufacturers of all kinds of Boilers and Tanks, and will be happy to forward Estimates for any particular kind of either on application.

WHITMORE AND BINYON,
ENGINEERS, MILLWRIGHTS, AND BOILER MAKERS,
IRON WORKS, WICKHAM MARKET, SUFFOLK, AND 28, MARK LANE, LONDON, E.C.

WATER WHEELS.

These are largely manufactured by W. and B. (of either wood or iron) for all heights of fall, and to suit the various circumstances to be dealt with. Their Iron Ventilated Water Wheels, constructed either with curvilinear buckets and side shrouding for the high falls, or with open-ended buckets and starts (as shown by Engraving) for the lower kind of falls, are strongly and confidently recommended. The Wheels are provided with improved water-delivery apparatus, and means for regulating the same, and motion may be transmitted through the shaft by wheels attached to the end of it, or by a toothed ring (geared either internally or externally) secured to the arms or ring of Water Wheel, in which case the shaft is relieved of any torsion, having merely to sustain the weight upon it, and the friction is reduced by the lessening of its dimensions and journals.



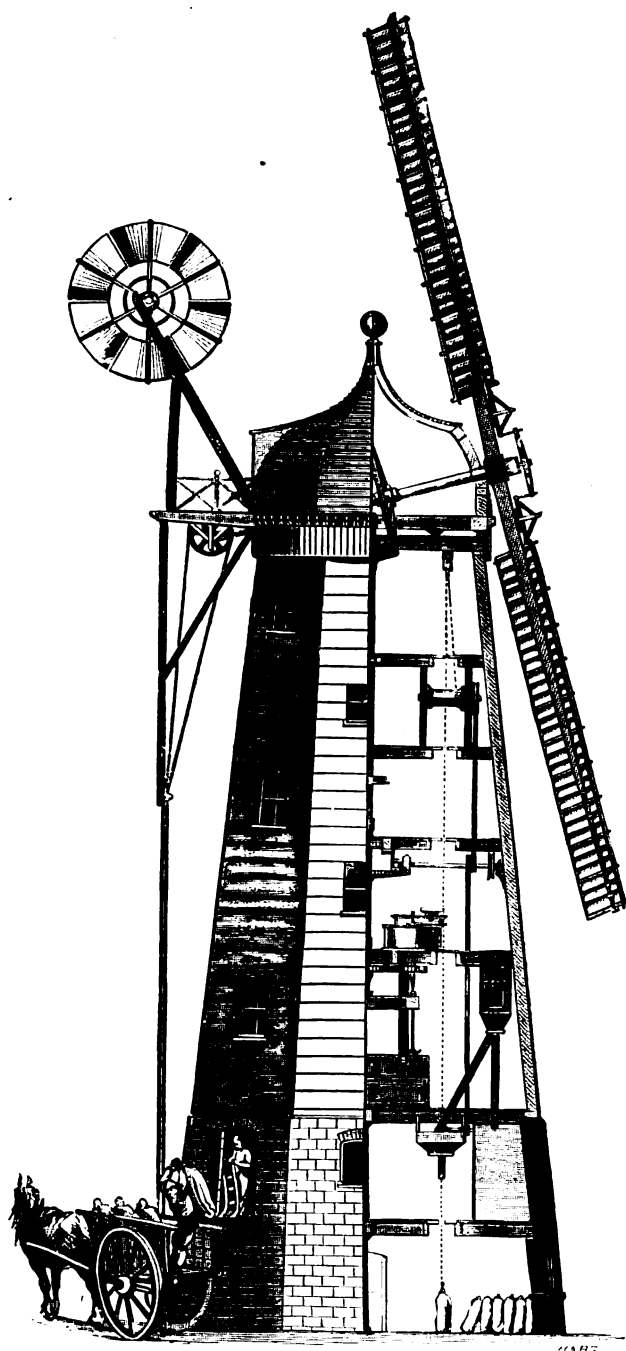
W. and B. have constructed large numbers, both for home use and for export, and have in all cases received high testimonials from their employers. Many may be seen in operation in the Eastern Counties and in the vicinity of London at any time, upon application through the Makers.

Prices and Designs of all kinds of Water Wheels will be supplied on application.

WHITMORE AND BINYON,
ENGINEERS, MILLWRIGHTS, AND BOILER MAKERS,
IRON WORKS, WICKHAM MARKET, SUFFOLK, AND 28, MARK LANE, LONDON, E.C.

R 2

WIND-POWER MACHINERY.



The annexed Engraving represents one of W. and B.'s Improved Windmills for grinding corn and dressing meal for flour, or for any other grinding purposes. They are fitted with improved patent self-adjustable sails and self-winding tackle, to keep the Mill always in wind, and the whole of the fittings are of the best materials and designs. The foreign demand for the Mills being large, W. and B. have given special attention in the construction, to facilitate their being taken to pieces and easily re-erected on their arrival abroad, all the pieces being carefully marked. They are constructed for from two to four or more pairs of stones, and the tower can be constructed either of woodwork as shown, or (as is mostly the case in this country) with brickwork or masonry, and of any height, according as circumstances may require. In localities where wind is uncertain, a convenient and inexpensive arrangement may be provided for the Machinery being driven by a portable or fixed Steam Engine adjacent to the tower. The Mill is thus rendered the more valuable and reliable, and its operations more regular and convenient.

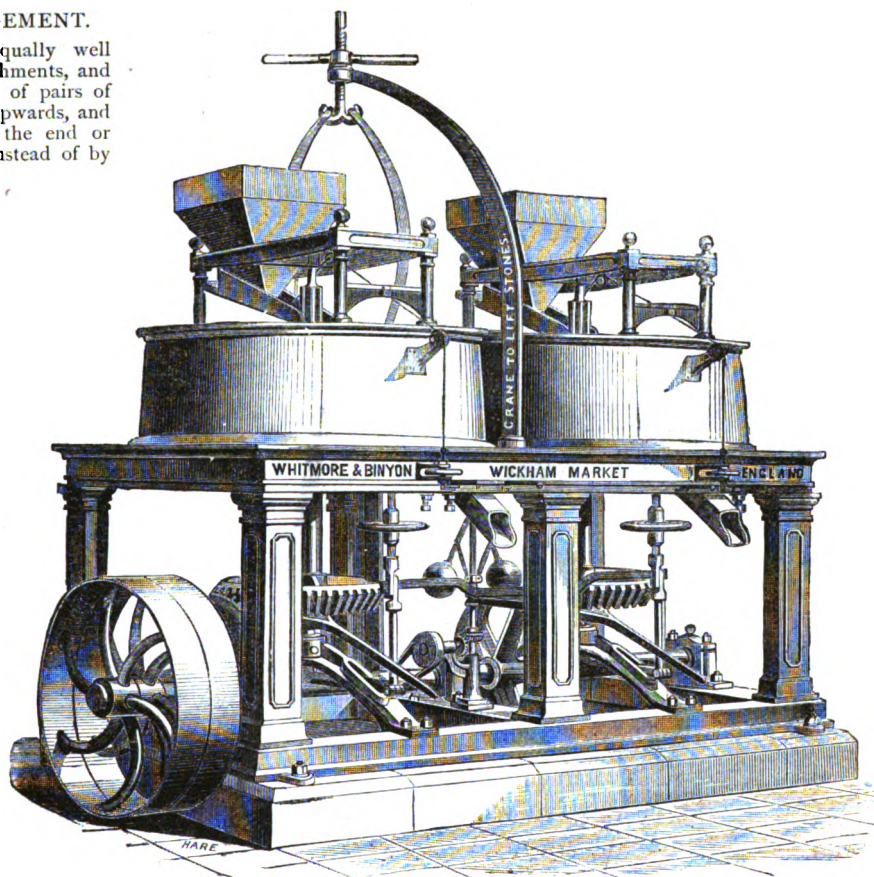
WHITMORE AND BINYON,
ENGINEERS, MILLWRIGHTS, AND BOILER MAKERS,
IRON WORKS, WICKHAM MARKET, SUFFOLK, AND 28, MARK LANE, LONDON, E.C.

BEVEL-GEAR ARRANGEMENT.

This form of Hurst is equally well adapted for Corn Mill Establishments, and is constructed for any number of pairs of stones of 42 inches diameter upwards, and can be driven by gearing at the end or direct from the power shaft, instead of by belt, as shown.

DIAMETER OF STONES	42 in.			48 in.		
	ℓ	s.	d.	ℓ	s.	d.
With French Stones	..	..	..	..	..	..
With one French Burr and one Derbyshire	76	0	0	94	0	0
Peak Stone	69	0	0	84	0	0
With Derbyshire Stones	62	0	0	74	0	0
Crane for lifting Stones	7	10	0	8	0	0
Extra for Loose Pulley	2	15	0	3	0	0
Extra if teeth of both wheels are pitched and trimmed.	2	2	0	2	10	0

DOUBLE MILLS twice the above Prices.

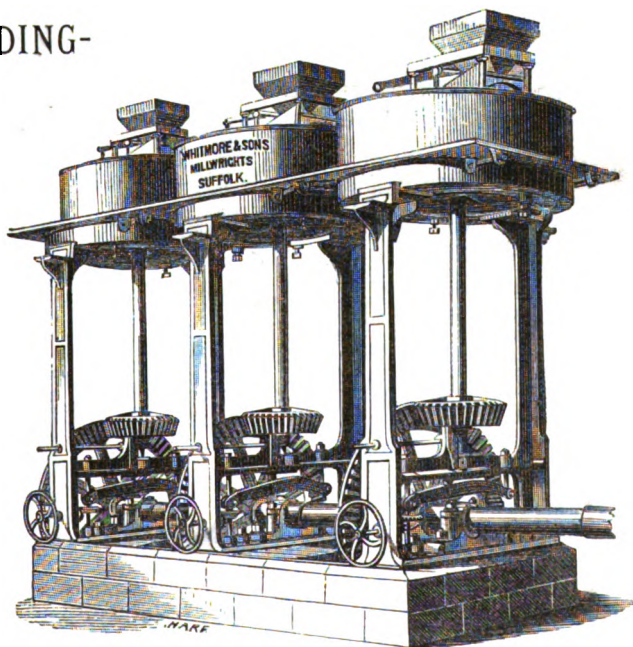


BEVEL OR COUNTER GEAR ARRANGEMENT.

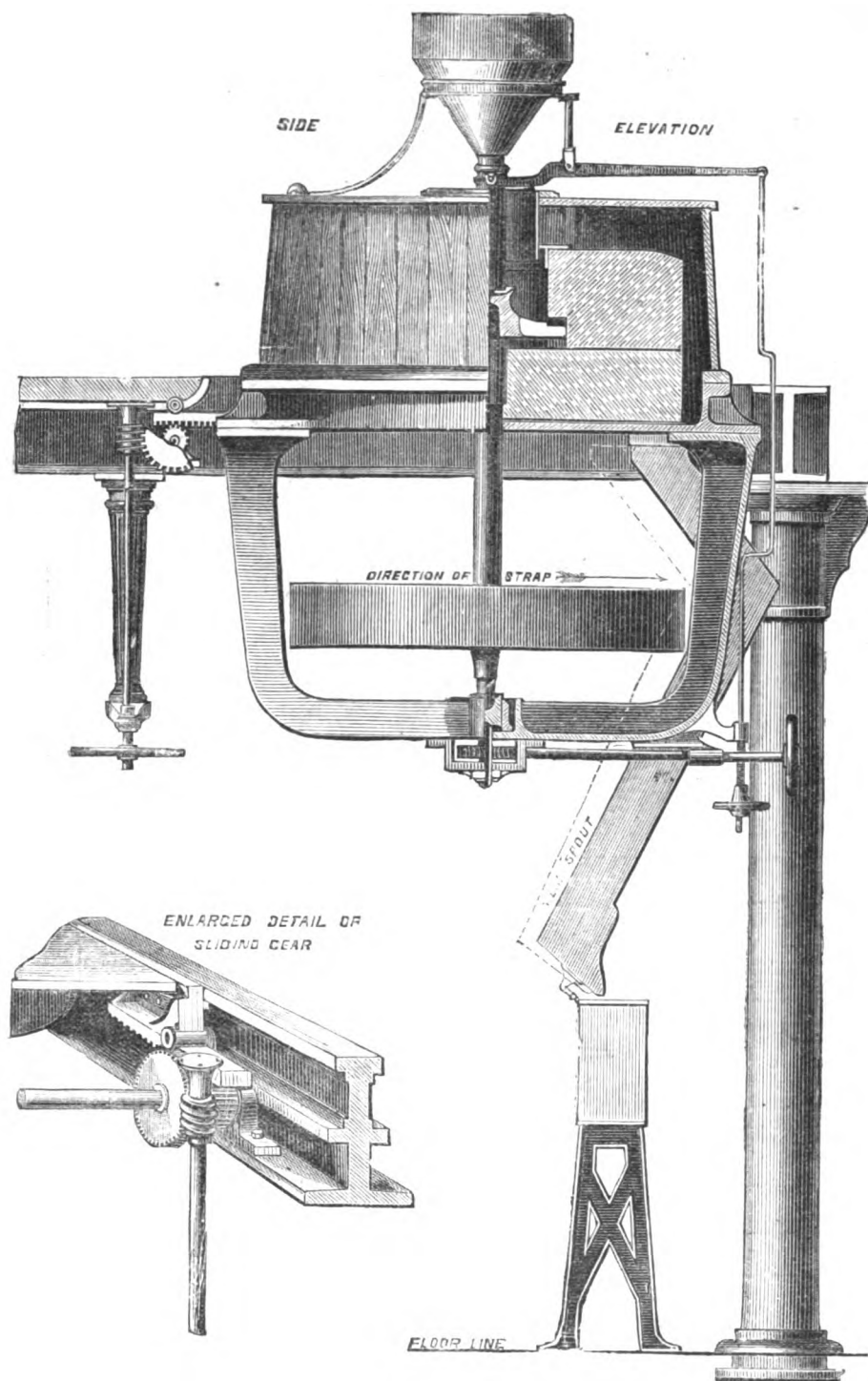
This description of Hurst is of very strong, simple, and compact form, and can be fitted for any number of pairs of stones, of any diameter, and the height can be varied to suit the requirements of any Mill, at the pleasure of the purchaser. Their independent form of construction renders them suitable for exportation. They are made adapted for grinding corn, rice, cement, or coprolite, and their fittings are of the most approved kind.

DIAMETER OF STONES ..		54"	48"	42"
For Frame 42" high .. per set		£ 63	£ 59	£ 52
"	" 48" " "	67	61	55
"	" 60" " "	74	66	57
"	" 72" " "	79	71	62

Packing about 5 per cent. extra—Millstones not included.



WHITMORE AND BINYON,
ENGINEERS, MILLWRIGHTS, AND BOILER MAKERS,
IRON WORKS, WICKHAM MARKET, SUFFOLK, AND 28, MARK LANE, LONDON, E.C.

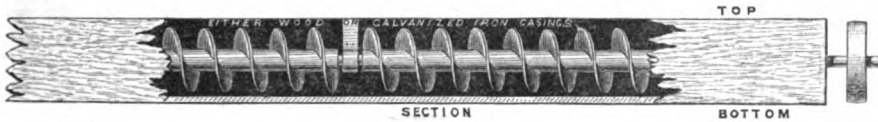


W. and B.'s patented arrangement for driving Millstones by endless bands, by which the necessity of press pulleys for tightening the belt is dispensed with, consequently much wear and tear of bands is avoided, and stones can be stopped or started at pleasure without regard to driving power. This has been applied at the Royal and Waterloo Flour Mills, London; Town Mills, Melksham, &c., &c., with the most successful results.

Prices on application.

WHITMORE AND BINYON,
ENGINEERS, MILLWRIGHTS, AND BOILER MAKERS,
IRON WORKS, WICKHAM MARKET, SUFFOLK, AND 28, MARK LANE, LONDON, E.C.

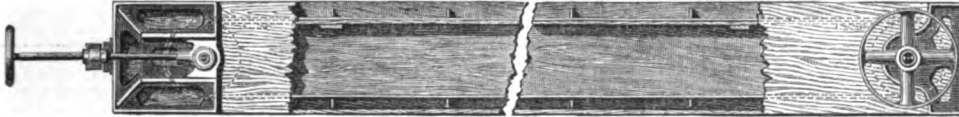
NEWLY-IMPROVED CONVEYERS FOR GRAIN.



The above are constructed of either wrought or cast metal of any length and of various diameters, and are provided with turned journals and suspension bearings, the whole compactly fitted in neatly finished wood or galvanized-iron cases.

ADJUSTABLE CONVEYERS FOR MEAL,

WITH ENDLESS BANDS AND WOOD PROPELLERS.



IMPROVED ADJUSTABLE ELEVATORS.

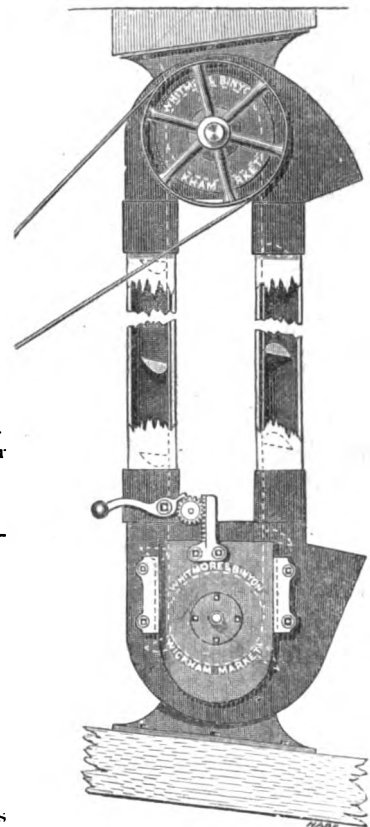
Size of Interior Pulleys	9" diam. 4½" wide.	12" diam. 6" wide.	15" diam. 7" wide.	18" diam. 8" wide.	30" diam. 9" wide.
The two Iron Heads with interior Pulleys, Spindles, Bearings, and Fittings, not adjustable	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Ditto, adjustable whilst in motion	5 0 0	6 12 0	8 16 0	11 10 0	15 10 0
Prepared Wood-Spouting, at per foot run	6 0 0	8 5 0	11 0 0	14 10 0	17 5 0
Three-ply Vulcanized Indiarubber Belting to suit width of Pulleys, at per ft.	0 0 9	0 0 10½	0 1 0	0 1 2	0 1 6
Tin Buckets for same, including fastenings, at per dozen	0 1 9½	0 2 2½	0 2 8	0 3 1	0 3 11
	0 5 6	0 7 6	0 8 0	0 9 6	0 12 6

The Driven Pulley is not included in the above. When required extra strong for coprolite and other like substances, the cost is augmented about 20 per cent.

MEAL, FLOUR, Etc., CONVEYERS.

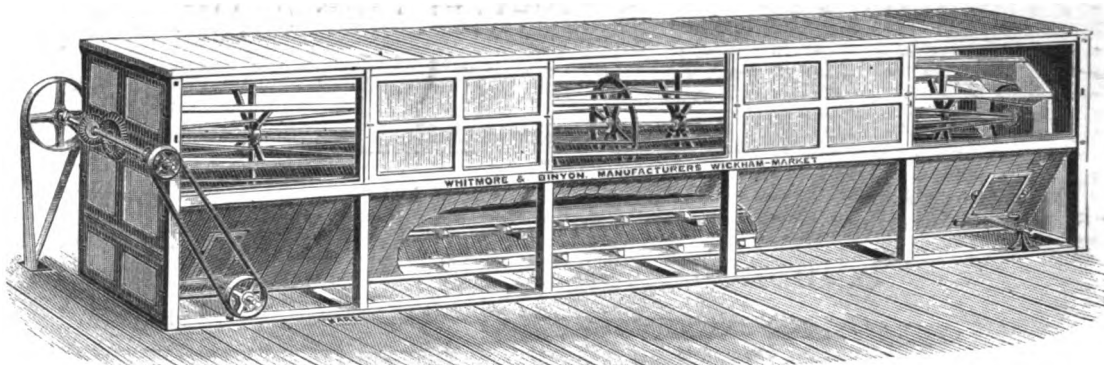
	For 6-in. Pulley.	For 9-in. Pulley.	For 12-in. Pulley.	For 15-in. Pulley.
Metal Adjustable Heads per set	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Non-adjustable ditto,,	4 4 0	4 15 0	5 5 0	5 15 0
Prepared Deal Troughing and hoes and fastenings, 2" and 2½" by 2" ply. Vulcanized Indiarubber Band, at per foot run	2 2 0	2 15 0	3 3 0	3 15 0
	0 3 6	0 4 0	0 4 6	0 5 0

The fittings of the above Head comprise Spindles, Interior Pulleys, Bearings (either adjustable or non-adjustable), and the Driven Pulleys of the same diameter as the interior ones.



• WHITMORE AND BINYON,
ENGINEERS, MILLWRIGHTS, AND BOILER MAKERS,
IRON WORKS, WICKHAM MARKET, SUFFOLK, AND 28, MARK LANE, LONDON, E.C.

IMPROVED MACHINES FOR DRESSING FLOUR THROUGH SILK.



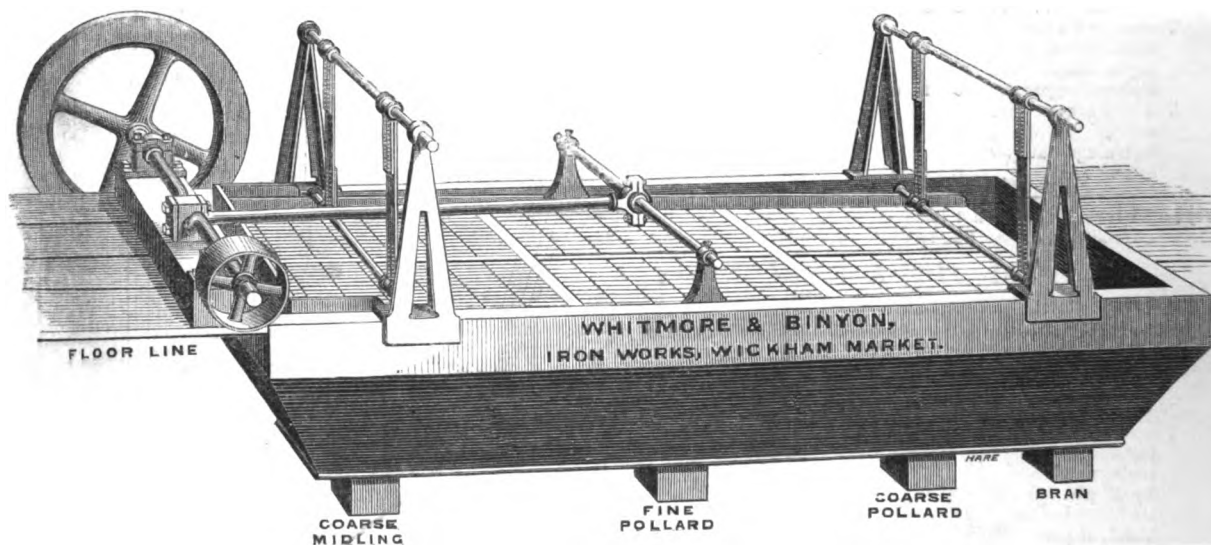
Length.	Single Mills.			Double Mills.			Best Manufactured Swiss Silk Cloth for each Reel.		
	£	s.	d.	£	s.	d.	From	£	to
16 feet.	29	10	0	55	10	0	6	8	
18 "	33	10	0	64	0	0	8	10	
20 "	37	10	0	72	0	0	9	11	
22 "	41	10	0	78	10	0	11	13	
24 "	44	0	0	85	0	0	12	14	
26 "	48	0	0	91	0	0	13	15	
28 "	51	0	0	98	0	0	14	16	
30 "	57	0	0	107	10	0	15	17	

The Prices of these vary according to Nos. of Silk adopted.

The Reels of the foregoing Mills are of W. and B.'s standard diameter of $3\frac{1}{2}$ feet, but other diameters of Reels and lengths of Mills can be made to order at proportionate prices.

The Prices include bottom improved endless band conveyer, and the driven pulley on reel shaft 27" diameter. If driven by gearing and cross-shaft, as illustrated, 70s. extra; if provided with feed roll and hopper, £4 extra. Packing, about 55s. Single Mills, and 82s. Double Mills.

BRAN SIFTERS OR OFFAL SEPARATORS.



Size of Machine	7' 0" x 2' 2"	8' 0" x 2' 6"	9' 0" x 3' 0"
Single Machine	£8 5s.	£9 18s.	£11
Will separate from pairs of stones	2 to 3 pairs.	3 to 4 pairs.	4 to 5 pairs.
Double Machines	£15	£18	£20
Will separate from pairs of stones	4 to 6 pairs.	6 to 8 pairs.	8 to 10 pairs.

Inclusive of Driven Pulley, but exclusive of Wire.

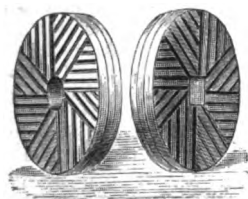
WHITMORE AND BINYON,
ENGINEERS, MILLWRIGHTS, AND BOILER MAKERS,
IRON WORKS, WICKHAM MARKET, SUFFOLK, AND 28, MARK LANE, LONDON, E.C.

SACKING CYLINDERS.

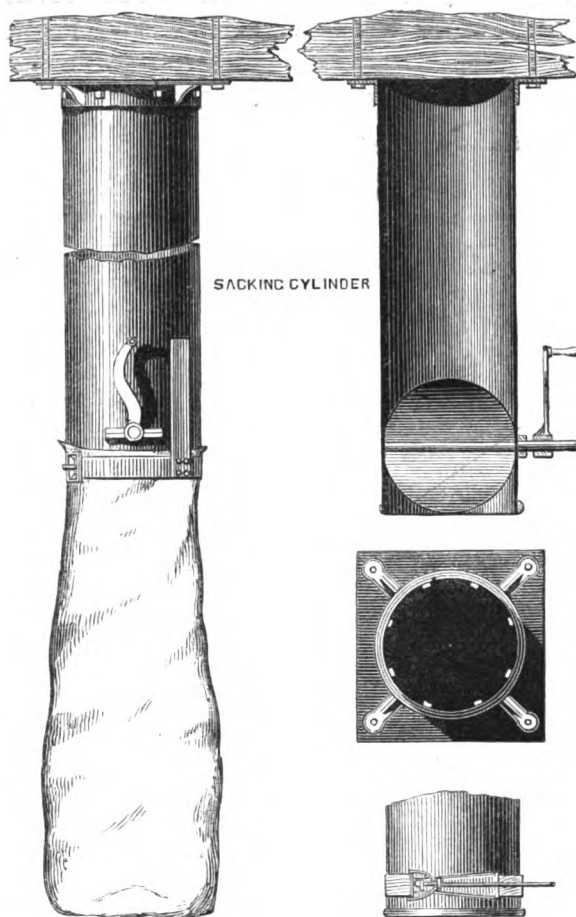
With Valves and Sack Fasteners, complete,
5 feet long, £3 15s. each. Other lengths made
to order at proportionate prices.

Packing extra.

MILLSTONES.



Prices on application.



MILL UTENSILS.

Wheat Screens.

Improved Sack-Barrows.

Ditto Screw Lifting-Jacks.

Best Cast-Steel Mill Bills.

Mill Bill-Handles.

Mahogany Stone-Staffs (in cases).

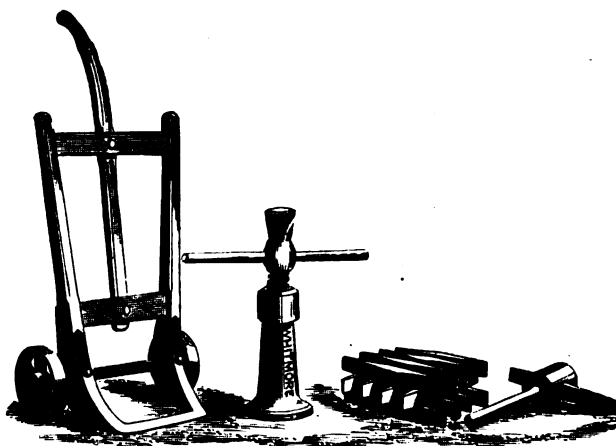
Metal Provers of first-class make.

Weighing Machines and Weights.

Scale Beams, Fittings, and Weights.

Pulley Blocks, with Wood, Iron, or Brass

Sheaves of all sizes.

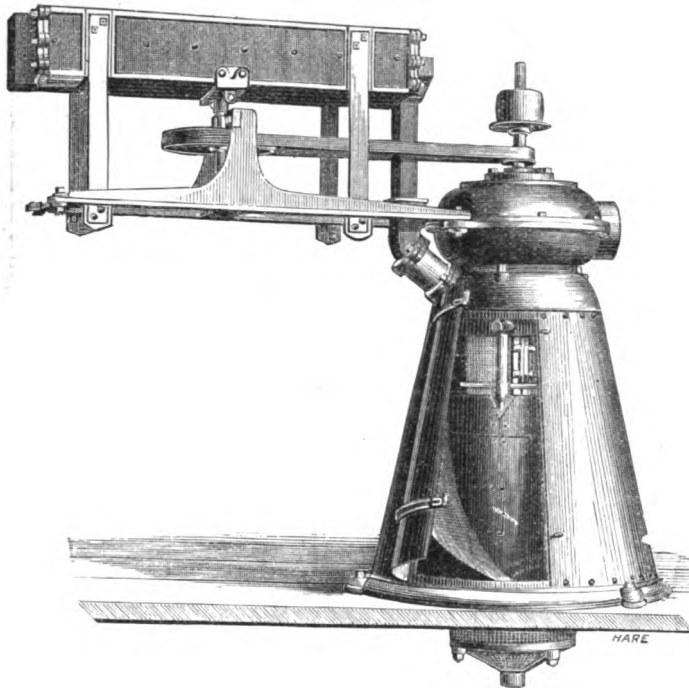


WHITMORE AND BINYON,
ENGINEERS, MILLWRIGHTS, AND BOILER MAKERS,
IRON WORKS, WICKHAM MARKET, SUFFOLK, AND 28, MARK LANE, LONDON, E.C.

S

IMPROVED COMBINED GRAIN-CLEANER.

MURDOCH'S PATENT. FIRE PROOF.



The object of this Machine is to perform the combined operations of a Smut Machine and Separator, the grain in its passage downward through the Machine being submitted to the action of spiral iron beaters, whereby the smut and other impurities found mixed with it are effectually crushed and beaten out in such manner as to avoid, on the one hand, the danger of crushing the grain, and on the other, the danger of its being passed through the apparatus without sufficient cleaning. The grain falls upon a cone, around the lower portion of which is an opening, through which the sound grain passes down; the smut and other impurities being carried up by means of a current of air, created by a suitable fan, through an annular space formed around the outer circumference of the wire casing; the light grain being deflected by a suitable projection of the Machine in such manner as to fall on the outside of the annular space, while the smut and other impurities are blown into a convenient receptacle apart from the Machine, thereby getting rid of a nuisance well known to millers, besides considerably lessening the risk of losing grain by its accidentally getting among the dust.

No.	Speed.	Height from Floor to top of Bridge.	Bushels per Hour.	Price.	Complete with Sifter Connections.
		ft. in.		£ s. d.	£ s. d.
1	950	4 8	40 to 50	33 0 0	44 10 0
2	800	5 6	70 „ 80	49 10 0	61 12 0
3	670	5 6	80 „ 100	55 0 0	67 0 0

ASHBY'S PATENT VERTICAL SMUT-MACHINE.

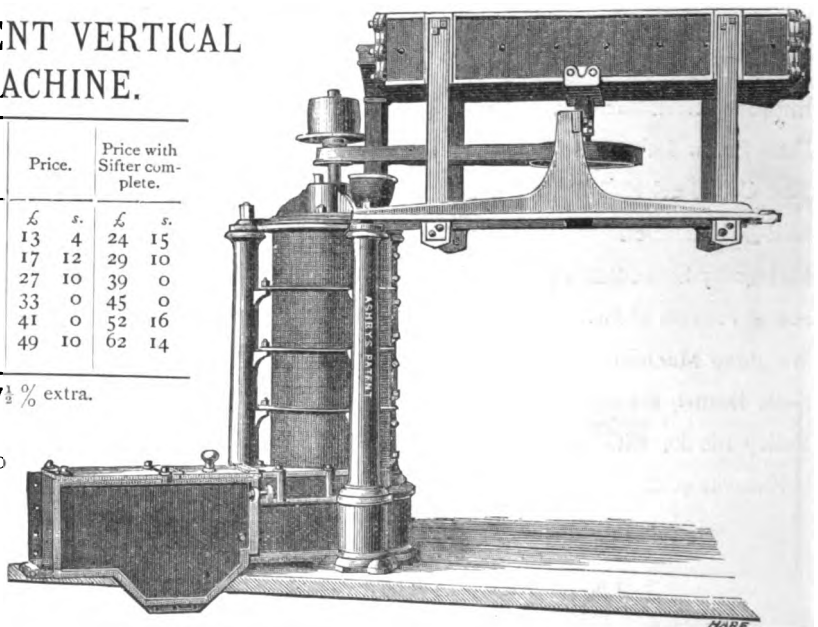
No.	Diameter.	Bushels per Hour.	Price.	Price with Sifter complete.
	inches.		£ s.	£ s.
1	12	25 to 40	13 4	24 15
1½	12	30 „ 50	17 12	29 10
2	14	50 „ 65	27 10	39 0
3	16	65 „ 80	33 0	45 0
4	18	80 „ 120	41 0	52 16
5	20	120 „ 160	49 10	62 14

Packing, about 7½ % extra.

MANUFACTURED AND SOLD

BY

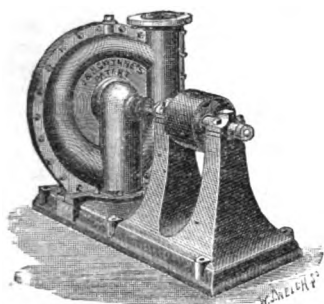
WHITMORE AND BINYON.



WHITMORE AND BINYON,
ENGINEERS, MILLWRIGHTS, AND BOILER MAKERS.
IRON WORKS, WICKHAM MARKET, SUFFOLK, AND 28, MARK LANE, LONDON, E.C.

PATENT IMPROVED CENTRIFUGAL PUMP.

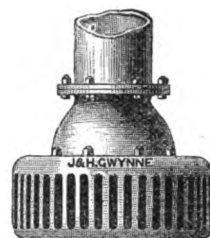
This class of Pump is suitable for raising from 15 to 7000 gallons per minute, to a height of 80 feet.



**CENTRIFUGAL PUMP,
WITH DOUBLE STANDARDS.**

No. of Pump.	Diameter of Suction and Discharge Pipe.	Quantity of Water discharged per Minute in Gallons.	Horse-power* to work the Pump one foot high.	Size of Driving Pulley.
	in.		H.-p.	diam. width.
1	1	12 to 25	·005	3 by 3½
2	2	44 „ 80	·018	4 „ 3½
3	3	75 „ 120	·030	4 „ 4
4	4	200 „ 300	·078	5 „ 4½
5	5	300 „ 500	·12	6 „ 6
6	6	500 „ 700	·20	8 „ 8
7	7	650 „ 1000	·26	10 „ 9
8	8	800 „ 1200	·32	12 „ 9
9	9	1000 „ 1600	·41	12 „ 9
10	10	1500 „ 2000	·60	14 „ 9
12	12	1800 „ 2800	·80	16 „ 10
15	15	3000 „ 5000	1 · 0	18 „ 12
16	16	3500 „ 6500	1 · 5	20 „ 12
18	18	4500 „ 7000	1 · 8	24 „ 13

* The power here given is for discharging the minimum quantity.



**FOOT VALVE
AND
GRATING.**

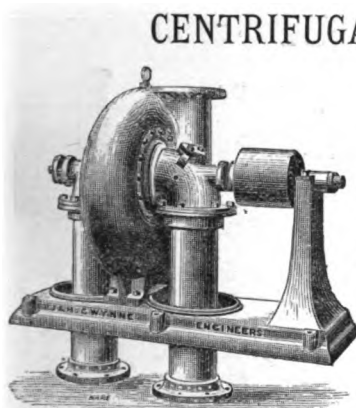
PATENT IMPROVED CENTRIFUGAL PUMPS (NEW PATTERN),

Specially adapted for Drainage or Irrigation. To throw from 2000 to 8000 gallons per minute, a height of 30 feet.

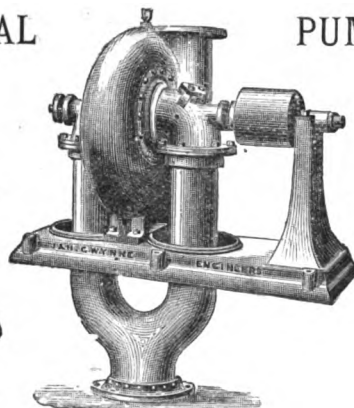
No. of Pump.	Diameter of Discharge Pipe.	Diameter and Width of Pulley.	Quantity of Water in Gallons raised per Minute.	Size packed for Shipment.	Weight.
10	10 in.	9 in. by 9 in.	2000	80 cubic feet.	16 cwt.
12	12 „	10 „ „ 10 „	3000	100 „	20 „
15	15 „	12 „ „ 12 „	4000	130 „	26 „
16	16 „	12 „ „ 12 „	5000	220 „	30 „
18	18 „	14 „ „ 12 „	6000	270 „	40 „
20	20 „	20 „ „ 13 „	8000	400 „	60 „

CENTRIFUGAL

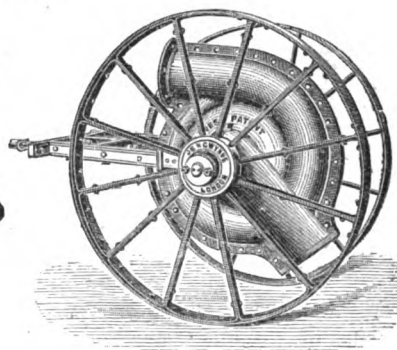
PUMPS.



New Pattern.



New Pattern, with Breeches Pipe.



On Swivelling Carriage.

PORTABLE CENTRIFUGAL PUMP, ON SWIVELLING CARRIAGE.

For temporary Drainage or Irrigation, to be drawn by either bullocks or horses.

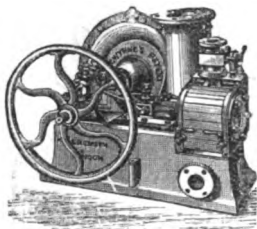
Number of Pump	4	5	6	7	8	9	10	12	15
Diameter of Pipes	4"	5"	6"	7"	8"	9"	10"	12"	15"
Quantity of Water raised } per minute, in gallons ..	250	400	600	800	1000	1500	2000	3000	4000
Diameter and Width of Pulley	5" x 4½"	6" x 6"	8" x 8"	10" x 9"	12" x 9"	12" x 9"	14" x 9"	16" x 9"	18" x 12"
Size Packed for Shipment ..	26 c. ft.	38 c. ft.	42 c. ft.	150 c. ft.	160 c. ft.	160 c. ft.	170 c. ft.	345 c. ft.	400 c. ft.
Weight	6 cwt.	8 cwt.	10 cwt.	14 cwt.	17 cwt.	18 cwt.	20 cwt.	35 cwt.	40 cwt.

Catalogues and Prices on application.

JOHN AND HENRY GWYNNE,
ENGINEERS. OFFICES: 89, CANNON STREET, E.C. WORKS: HAMMERSMITH IRON
WORKS, LONDON, W.

PATENT DIRECT-ACTING CENTRIFUGAL PUMPING ENGINES,

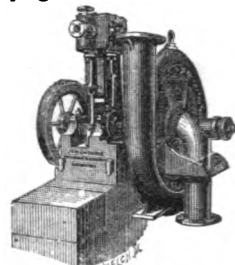
For circulating the water in Surface Condensers of Marine Engines and general pumping.



Horizontal Engine.

Size.	Diam. of Suction and Discharge Pipe.	Horse-power.
No. 3.	3-inch, to discharge	25 (20 feet head)
" 4.	" "	40 "
" 5.	" "	50 "
" 6.	" "	60 and 70 "
" 7.	" "	80 to 90 "
" 8.	" "	100 " 130 "
" 9.	" "	150 " 200 "
" 10.	" "	250 "
" 12.	" "	300 "
" 15.	" "	400 "
" 18.	" "	500 "
" 24.	" "	700 "

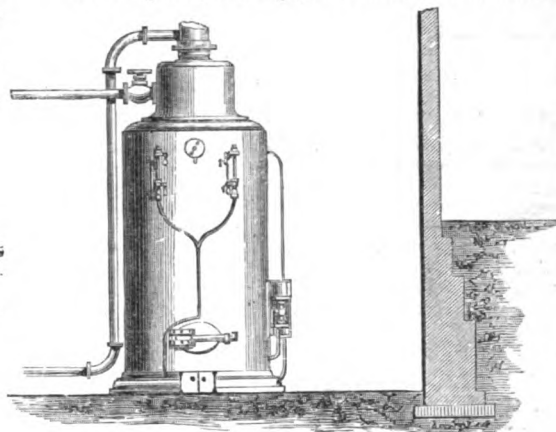
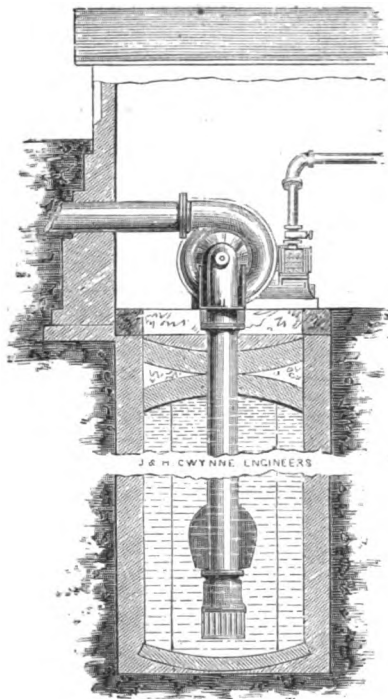
If these Engines are fitted with *variable* Expansion Gear, 15 per cent. extra.



Vertical Engine.

PATENT DIRECT-ACTING CENTRIFUGAL PUMPING ENGINES.

For Irrigation, Drainage, Reclamation, Manufacturing, or other purposes.



Size of Pumping Engine.	Size of Suction and Discharge Pipe.	Quantity of Water discharged per Minute.
No.		Gallons.
3	3"	120
4	4"	300
5	5"	450
6	6"	650
7	7"	900
8	8"	1000
9	9"	1350
10	10"	1800
12	12"	2700
15	15"	4000
18	18"	6500
24	24"	11,000

If these Engines are fitted with Variable Expansion Valves, 15 per cent. extra.

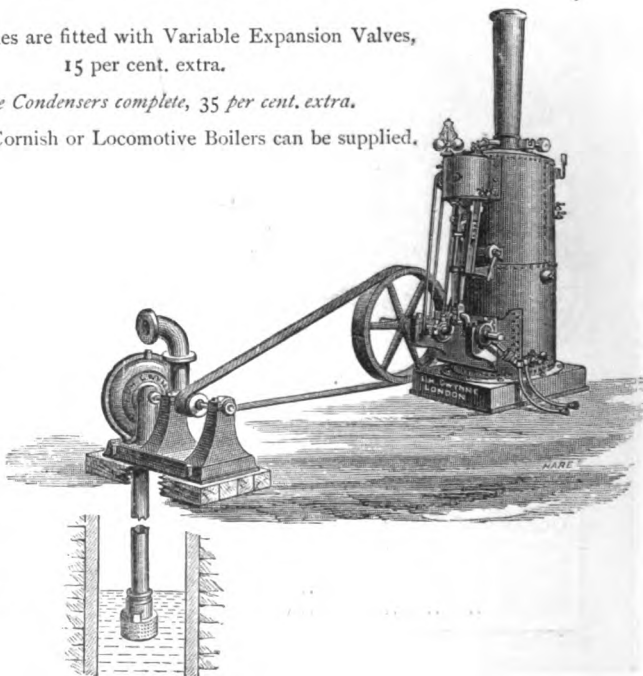
Surface Condensers complete, 35 per cent. extra.

If preferred, Cornish or Locomotive Boilers can be supplied.

VERTICAL STEAM-ENGINE AND PATENT CENTRIFUGAL PUMP.

Patent Centrifugal Pump, fixed over a well, for irrigation or any other purpose. When the water is more than 28 feet from the surface, the Pump can be fixed 25 or 30 feet down the well, and the Engine fly-wheel arranged to work over it; or a counter shaft fixed in the top of the well, and the Engine fixed at some distance from it. These Engines will be found less expensive than either portable or fixed Engines and Boilers, as the above only require sufficient foundation to sustain their weight, being entirely self-contained.

Catalogues and Prices on application.



JOHN AND HENRY GWYNNE,
ENGINEERS. OFFICES: 89, CANNON STREET, E.C. WORKS: HAMMERSMITH IRON-
WORKS, LONDON, W.

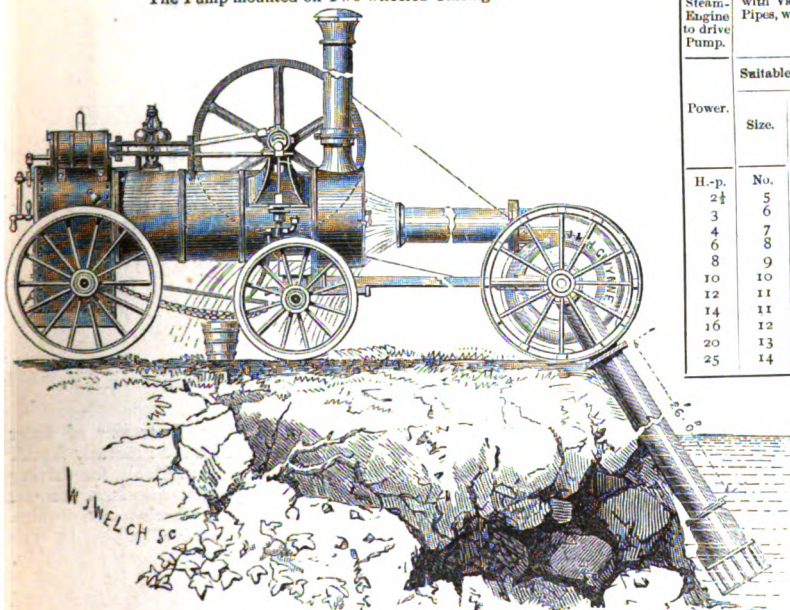
PATENT PORTABLE DIRECT-ACTING PUMPING ENGINE.

Size of Engine.	Gallons of Water discharged per Minute.
No.	
3	120
4	300
5	450
6	650
7	900
8	1100
9	1300
10	1800
12	2700
15	4000

These Pumping Engines are admirably suited for the Contractor, Colonist, or Squatter, and will be found of immense advantage where Temporary Drainage, Irrigation, or any description of Pumping is required. They are constructed with every care, and are of the *very best* material and workmanship, having in view portability and efficiency. The carriage is arranged to hold these pipes when disconnected, and can be fitted with shafts or a pole for draught. This class of Engine is also made with horizontal tubular boiler.

PORTABLE STEAM-ENGINE AND PATENT PORTABLE CENTRIFUGAL PUMP.

The Pump mounted on Two-wheeled Carriage.



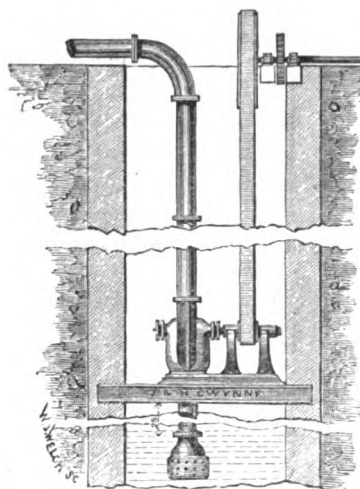
Portable Steam-Engine to drive Pump.		Patent Portable Centrifugal Pumps, on Bed Plate, with Valve Box and Strainer, Suction and Discharge Pipes, with Bend complete; mounted on Two-wheeled Carriage.					
		Suitable for Lifts of 12 Ft.			Suitable for Lifts of 25 Ft.		
Power.		Size.	Gallons raised per Minute.	Weight of Pump and Pipes.	Size.	Gallons raised per Minute.	Weight of Pump and Pipes.
H.-p.	No.			cwt.	No.		cwt.
2½	5		450	14	4	250	12
3	6		650	18	4	350	12
4	7		1000	23	5	450	17
6	8		1500	28	6	650	20
8	9		2000	32	7	950	27
10	10		2500	40	8	1200	34
12	11		3000	46	9	1500	37
14	11		3500	46	10	1700	44
16	12		4000	58	10	2000	44
20	13		5500	70	11	2500	54
25	14		7000	85	12	3500	60

These Engines and Pumps are applicable to all the purposes of the fixed pump, but used for localities where frequent removals are necessary. A great many of these Pumps have been supplied for sheep-washing and irrigation in Australia, New Zealand, Tasmania, and South America, where they have given great satisfaction.

The shafts of the Pump Carriage are arranged to fit in two sockets on the "Fore Carriage" of the Portable Engine. This arrangement keeps both the Engine and Pump in their proper positions, so that the driving belt is kept tight. There are several other plans of mounting the Pump on Carriages, which may be arranged with pole for bullocks, and shafts for horses.

CATALOGUES AND PRICES ON APPLICATION.

JOHN AND HENRY GWYNNE,
ENGINEERS. OFFICES: 89, CANNON STREET, E.C. WORKS: HAMMERSMITH IRON-
WORKS, LONDON, W.

CENTRIFUGAL
PUMPS,WORKED BY HORSE, MULE, OR
BULLOCK POWER.FOR COUNTRIES
WHERE FUEL IS EX-
PENSIVE AND
SKILLED LABOUR
DIFFICULT TO
OBTAIN.

Horse Gears, with Pumps, Pipes, Belts, complete, ready for putting to work, for lifts up to 10 feet.			Horse Gears, with Pumps, Pipes, Belts, complete, ready for putting to work, for lifts up to 20 feet.			Horse Gears, with Pumps, Pipes, Belts, complete, ready for putting to work, for lifts up to 30 feet.		
Size of Mill.	Size of Pump.	Quantity of Water per Minute.	Size of Mill.	Size of Pump.	Quantity of Water per Minute.	Size of Mill.	Size of Pump.	Quantity of Water per Minute.
H.-gear. 1	No. 4	Galls. 200	H.-gear. 1	No. 3	Galls. 100	H.-gear. 1	No. 2	Galls. 45
2	6	450	2	4	200	2	3	90
3	8	800	3	5	350	3	4	140
4	9	1000	4	6	500	4	5	250

CENTRIFUGAL PUMP WORKED BY WINDMILL.

This arrangement for working Centrifugal Pumps is particularly suited for the Colonies or other countries where a current of air may be relied on, for raising water from wells, rivers, or ponds, for irrigation, &c.

WINDMILL.

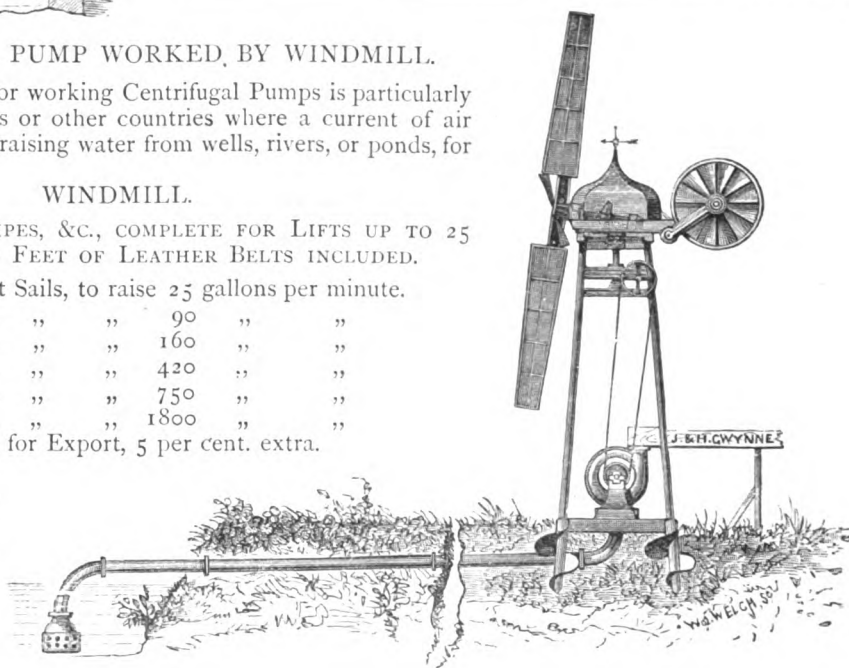
WITH PUMP AND PIPES, &C., COMPLETE FOR LIFTS UP TO 25 FEET,* WITH 35 FEET OF LEATHER BELTS INCLUDED.

Mill, with 15-feet Sails, to raise 25 gallons per minute.

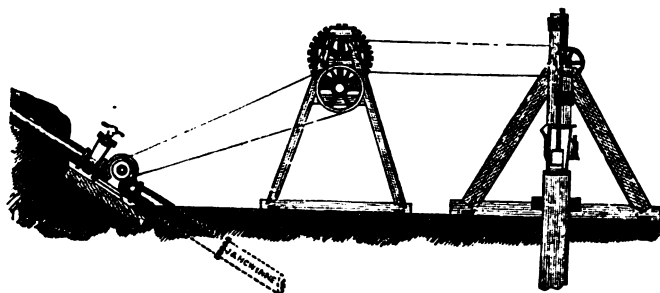
"	"	24	"	"	"	90	"	"
"	"	34	"	"	"	160	"	"
"	"	45	"	"	"	420	"	"
"	"	55	"	"	"	750	"	"
"	"	65	"	"	"	1800	"	"

Packing for Export, 5 per cent. extra.

* If required, the Pumps can be arranged to throw a less quantity of water to a greater height, or a greater quantity to a lesser height.



TURBINE, WITH HORIZONTAL SHAFT, DRIVING STAMPING MACHINERY.



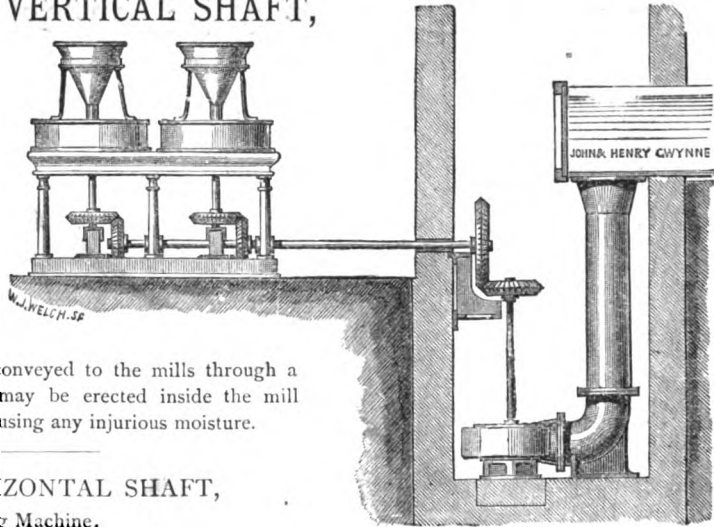
In mining districts small streams of water falling from great heights are generally found, which cannot be made available for driving machinery by ordinary water-wheels, on account of the great diameter such wheels would require. A very small and inexpensive Turbine in such a case will answer the purpose admirably. Such a Turbine may frequently be placed in the line of the piping, as per sketch, and requires scarcely any foundation; in fact, it may be frequently supported by the piping alone.

JOHN AND HENRY GWYNNE,
ENGINEERS. OFFICES: 89, CANNON STREET, E.C. WORKS: HAMMERSMITH IRON-
WORKS, LONDON, W.

TURBINE, WITH VERTICAL SHAFT,

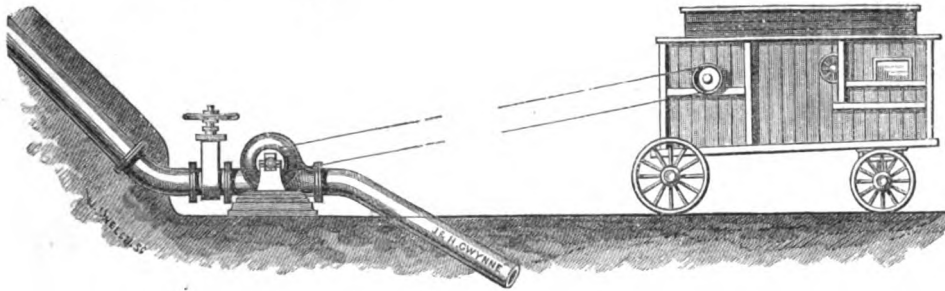
Driving a Corn Mill with two pairs of Stones.

Turbines are preferable to ordinary water-wheels for driving corn mills, not only on account of their greater efficiency, but also on account of their steady motion, which is of great importance in driving machinery that is at work day and night, as well as having a decided influence on the quality of the flour ground. The gearing generally required consists of a pair of light bevel-wheels, the power being conveyed to the mills through a line shaft. If necessary, the Turbine may be erected inside the mill without taking up any useful space, or causing any injurious moisture.



TURBINE, WITH HORIZONTAL SHAFT,

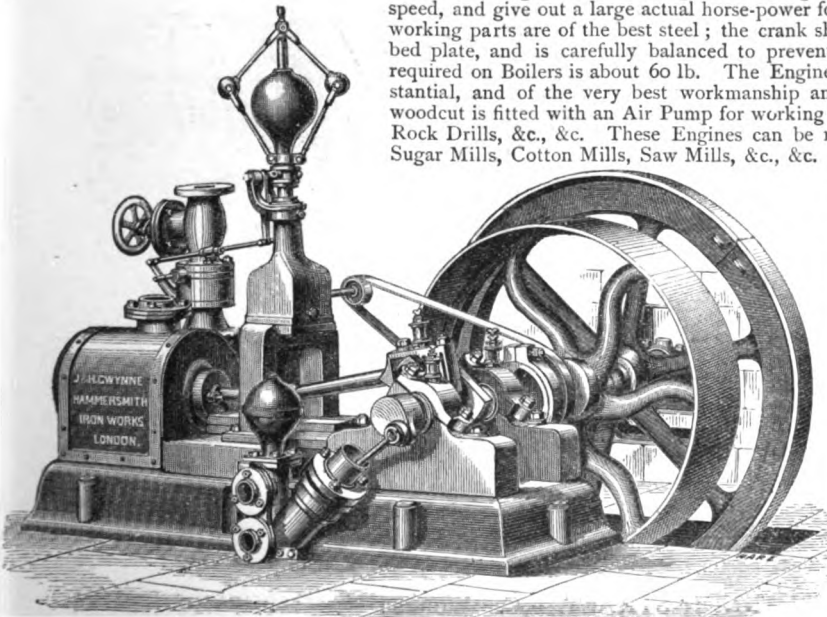
Driving a Thrashing Machine.



For driving Thrashing Machines and other Farm Machinery, Turbines are particularly suitable, on account of the high speed at which they run, and the little water they consume. If the Turbine is one with Horizontal Shaft the power can always be transmitted direct by pulleys and a strap to the Thrashing Machine, or to a line shaft running at a high velocity, which is the most suitable for this class of machinery.

HORIZONTAL HIGH-PRESSURE ENGINES.

The annexed woodcut is engraved from a photograph of one of our high-speed Horizontal Engines. These Engines are designed and constructed to work at a high speed, and give out a large actual horse-power for the size of the Cylinder. All the working parts are of the best steel; the crank shaft is made with double bearings in bed plate, and is carefully balanced to prevent vibration. The pressure of steam required on Boilers is about 60 lb. The Engines altogether are very compact, substantial, and of the very best workmanship and material. The one shown in the woodcut is fitted with an Air Pump for working Compressed Air Machinery, such as Rock Drills, &c., &c. These Engines can be made with long strokes, suitable for Sugar Mills, Cotton Mills, Saw Mills, &c., &c.



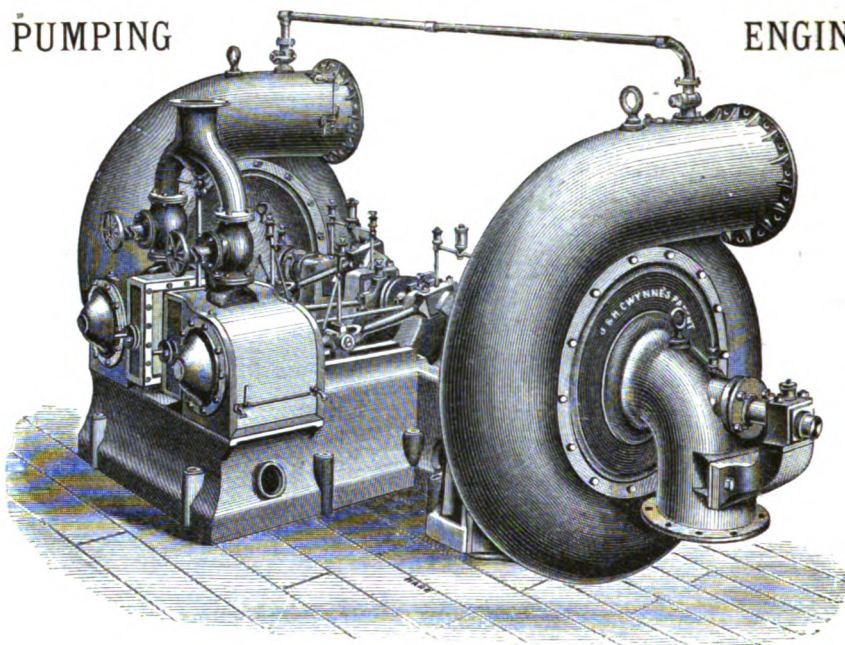
Horse-power.			Diam. of Cylinder.	Length of Stroke.	Revolutions per Minute.
	Nom.	Indicated.			
1	1 1/2	1 3/4	3 1/2	3 1/2	300
2	2 1/2	3 1/2	4 1/2	4 1/2	270
2 1/2	3 1/2	5	4 1/2	4 1/2	270
3	4 1/2	5 3/4	5 1/2	4 1/2	270
3 1/2	5 1/2	8 1/2	6	6	250
4	6 1/2	10	6 1/2	6 1/2	240
4 1/2	7 1/2	14 1/2	7 1/2	7 1/2	220
5	8 1/2	16	8	8	200
5 1/2	9 1/2	23	9	9	199
6 1/2	10 1/2	28	10	10	180

Catalogues and Prices on application.

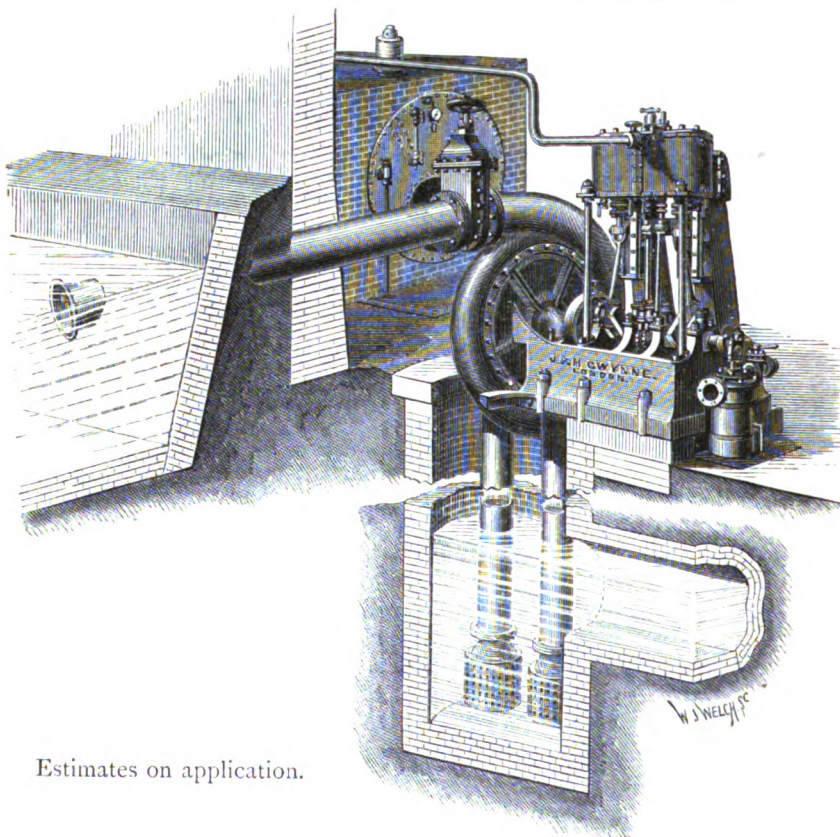
JOHN AND HENRY GWYNNE,
ENGINEERS. OFFICES: 89, CANNON STREET, E.C. WORKS: HAMMERSMITH IRON WORKS, LONDON, W.

HIGH-PRESSURE OR COMPOUND DIRECT-ACTING CENTRIFUGAL PUMPING ENGINES,

Fitted with Surface or Jet Condensers, for Graving



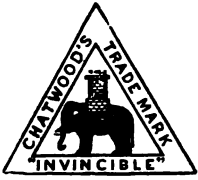
Docks, Irrigation, Drainage, or Reclamation Works.



Estimates on application.

JOHN AND HENRY GWYNNE,
ENGINEERS. OFFICES: 89, CANNON STREET, E.C. WORKS: HAMMERSMITH IRON-
WORKS, LONDON, W.

SECURITY FROM FIRE AND THIEVES.



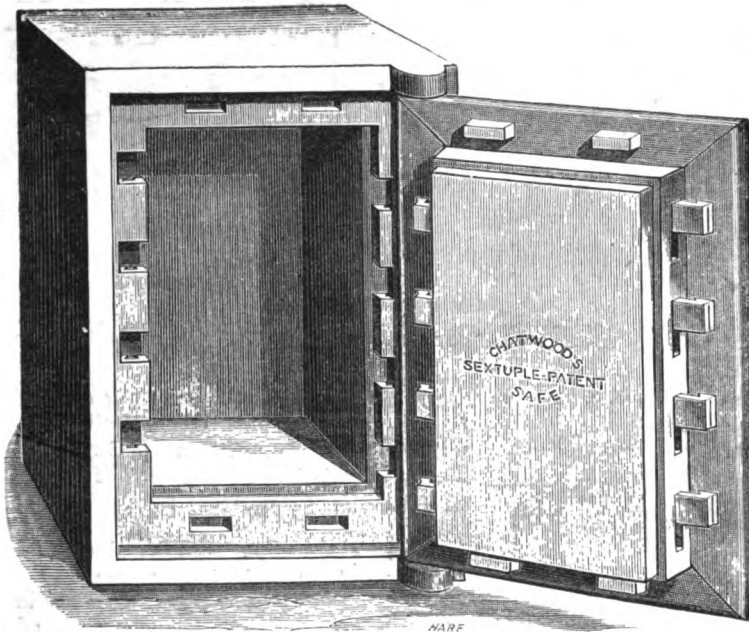
CHATWOOD'S

"INVINCIBLE"

SAFES.

PRIZE MEDALS

AT
VIENNA,
PARIS,
DUBLIN,
OPORTO,
LONDON,
HAVRE,
AND
WHEREVER
EXHIBITED.



PRIZE MEDALS

AT
VIENNA,
PARIS,
DUBLIN,
OPORTO,
LONDON,
HAVRE,
AND
WHEREVER
EXHIBITED.

DEED CHESTS, CASH BOXES, AND LOCKS. STRONG-ROOM DOORS
AND FRAMES.

FIRE AND BURGLAR PROOF ROOMS constructed to resist the fiercest fire and the most skilled
burglar. Details upon application at the Dépôts.

CHATWOOD'S SAFE DEPÔT,

120, CANNON STREET, LONDON, E.C. ;
13, CROSS STREET, MANCHESTER ; AND LANCASHIRE SAFE WORKS, BOLTON.

T

FIRE-PROOF SAFES.

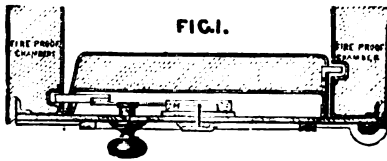


FIG. 1 is an Engraving showing Section through door and parts of sides of the Fire-proof Safe usually sold by respectable Manufacturers.

FIGS. 2 and 2 A show Sections through door and parts of sides of CHATWOOD's ordinary Fire-resisting Safe, List 2 quality, with his Patent T iron Frame and solid flange lock case.

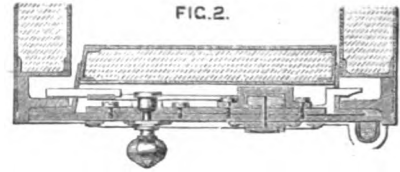


FIG. 2 A.

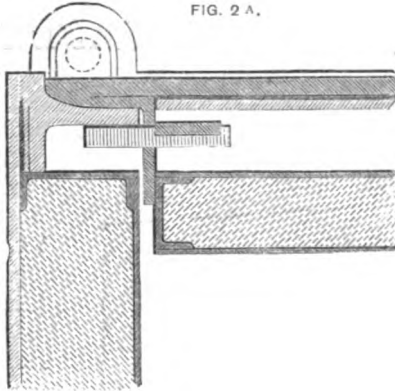
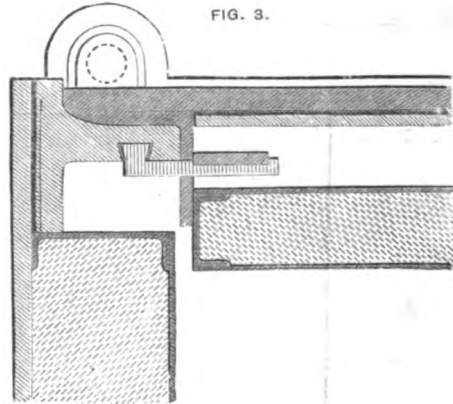


FIG. 3.



BURGLAR-PROOF SAFES.

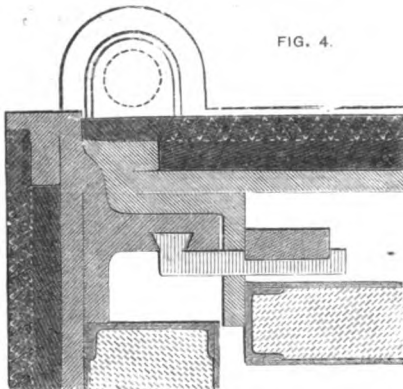


FIG. 3.—Section through door and side of CHATWOOD's Quadruple Patent Safe, List 4 quality, showing patent Dove-tail Claw Bolts and Patent T Girder Frame, with slots to receive claw bolts and solid flange lock case, recommended as Cash Safes for ordinary risks.

FIG. 4.—Section through door and part of side of CHATWOOD's Octuple Patent Safe, List 8 quality, showing Claw Bolt Fitting in Dovetail Recesses in T Girder Frame all round the Safe; curvilinear edge of door with corresponding curved seating on sides and conical intersections of *spiegelisen* and steel, absolutely solid, two inches thick on all sides.

The difference in the principles of construction between CHATWOOD's Safes and all others is seen in the above engravings, and is such as must convince all practical buyers of the immense superiority of CHATWOOD's Patent "Tee Frame" and "solid flange" lock case over the sheet-iron chamber of Fig. 1, in which are situated the bolt holes and the sheet-iron lock case attached to the door by small stove screws adopted by other makers.

"Mr. CHATWOOD is the only Safe Maker who exhibits the details of his construction, both in drawing and in detailed parts of his Safes, while the other manufacturers of similar articles do not seem to think that they possess much that is worth showing in that direction."—*Engineering*, May 3rd, 1867.

"A series of the most severe tests with these Safes have proved them to be impregnable to the scientific burglar. Mr. CHATWOOD has added Safe-manufacture as a new branch to practical Engineering."—*Official Report, Dublin International Exhibition*, 1865.

"There is no opportunity of getting a wedge in The bolts and catches are of great strength, and no forcing by hand-power, however assisted by tackle, could separate them. . . . No drill can touch such a combination (of hard and soft metals), and no force less than that of a steam hammer or cannon shot could ever break through it."—*Zerah Colburn, Esq., C.E., President of Society of Engineers*.

CHATWOOD'S SAFE DEPÔT,

120, CANNON STREET, LONDON, E.C.; 13, CROSS STREET, MANCHESTER;
AND LANCASHIRE SAFE AND LOCK WORKS, BOLTON.

Sizes and Net Prices of Chatwood's "Invincible" Safes,

Fire Resisting and Burglar Proof.

SINGLE DOORS WITHOUT FITTINGS.

No.	OUTSIDE DIMENSIONS.			LIST 2.			LIST 3.			LIST 4.			LIST 6.			LIST 8.		
	Height.	In Inches. Width.	Depth.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
00	20	14	14	8	0	0												
0	22	16	16	9	0	0												
1	24	18	18	10	0	0	14	0	0	24	15	0	45	5	0			
2	26	20	20	12	10	0	17	10	0	30	0	0	55	0	0	* The best made.		
3	28	22	22	15	0	0	21	0	0	35	15	0	65	10	0			
4	30	24	24	17	10	0	24	10	0	42	0	0	77	0	0	140	0	0
5	33	26	24	20	0	0	27	15	0	47	10	0	86	15	0	158	0	0
6	36	26	24	24	10	0	29	10	0	50	10	0	92	10	0	168	10	0
7	42	26	24	26	0	0	33	0	0	56	15	0	103	10	0	189	5	0
8	48	28	26	28	15	0	40	10	0	69	0	0	126	15	0	233	10	0
9	54	30	26	32	15	0	46	5	0	79	5	0	145	5	0	264	5	0
10	60	30	26	36	0	0	50	10	0	86	5	0	158	0	0	287	10	0
11	60	33	28	40	0	0	55	15	0	95	10	0	227	15	0	318	10	0

Fittings made to order.

DOUBLE DOORS, INCLUDING FITTINGS.

No.	OUTSIDE DIMENSIONS.			LIST 2.			LIST 3.			LIST 4.			LIST 6.			LIST 8.		
	Height.	In Inches. Width.	Depth.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
12	30	30	24	25	0	0	35	10	0	59	5	0	110	10	0	* The best made.		
13	33	33	24	30	10	0	39	15	0	67	0	0	125	15	0			
14	36	36	28	33	5	0	47	15	0	81	0	0	152	0	0			
15	40	36	28	37	0	0	51	0	0	87	0	0	165	15	0			
16	48	38	28	43	10	0	62	10	0	105	5	0	196	10	0	359	0	0
17	54	40	30	51	5	0	72	5	0	122	5	0	229	0	0	418	10	0
18	60	48	30	61	10	0	89	0	0	149	10	0	278	5	0	507	0	0
19	66	54	30	76	10	0	107	10	0	177	15	0	327	0	0	592	0	0
20	72	60	30	91	10	0	130	0	0	210	10	0	381	5	0	685	0	0

Fittings range from two drawers at foot of Safe up to six drawers in centre, with various partitions to order.

* Chatwood's Safes are the only ones sold subject to a test of thirty-six hours with any kind of burglar's appliances before delivery.

CHATWOOD'S PATENT FIRE-RESISTING DEED BOXES.

No.	SIZE.				No.	SIZE.			
		£	s.	d.			£	s.	d.
1	12 X 10 X 10	3	0	0	8	26 X 20 X 20	9	0	0
2	14 „ 11 „ 11	3	10	0	9	28 „ 22 „ 22	10	10	0
3	16 „ 12 „ 12	4	0	0	10	30 „ 24 „ 24	12	0	0
4	18 „ 13 „ 13	5	0	0	11	33 „ 25 „ 25	14	0	0
5	20 „ 14 „ 14	6	0	0	12	36 „ 26 „ 26	16	0	0
6	22 „ 16 „ 16	7	0	0	13	42 „ 28 „ 28	20	0	0
7	24 „ 18 „ 18	8	0	0					

Without Fittings.

Cash Boxes and Locks of every description, unpickable and gunpowder proof.—Price Lists on application.

IRON AND STEEL DOORS AND FRAMES.

No.	DIMENSIONS. Outside of Frame.		LIST 2.			LIST 3.			LIST 4.			LIST 6.			LIST 8.		
	Height. 5ft. 6in.	Width. 2ft. 6in.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
1	6	0	20	0	0	30	5	0	41	10	0	52	15	0	151	5	0
2	6	0	22	10	0	33	0	0	45	10	0	58	0	0	178	15	0
3	6	0	27	0	0	38	10	0	51	0	0	63	5	0	199	5	0
4	6	6	27	0	0	38	10	0	51	0	0	63	5	0	199	5	0
5	6	6	33	0	0	41	15	0	55	0	0	70	0	0	220	0	0
6	7	0	36	0	0	46	5	0	60	15	0	75	0	0	240	10	0

Price Lists, Testimonials, Drawings, and Specifications can be had post free on application.

CHATWOOD'S SAFE DEPÔT,

120, CANNON STREET, LONDON, E.C.; 13, CROSS STREET, MANCHESTER;
AND LANCASHIRE SAFE AND LOCK WORKS, BOLTON.

THE "EUREKA"

(Registered)

COMBINED CIRCULAR AND BAND-SAW SAWING MACHINE.

FOR HAND OR STEAM POWER.

The Machine illustrated on the previous page combines in a simple and compact form all the advantages of a Circular-Saw Bench and a Band-Saw Table.

The Band Saw, for curved and pattern work, is made to pass over two pulleys and the heavy fly-wheel A, thereby securing greater uniformity of tension and less liability to break. The table is held in position by a quadrant, which allows it to be canted to any angle for bevel cutting.

Timber may be sawn up to 5 inches thick with either the Band or Circular Saw. For tenoning and rebating, the 9-inch saw is used, and the spindle adjusted to the required height by means of the hand screw B.

C is a lever handle which throws in and out of gear a self-acting drag-motion.

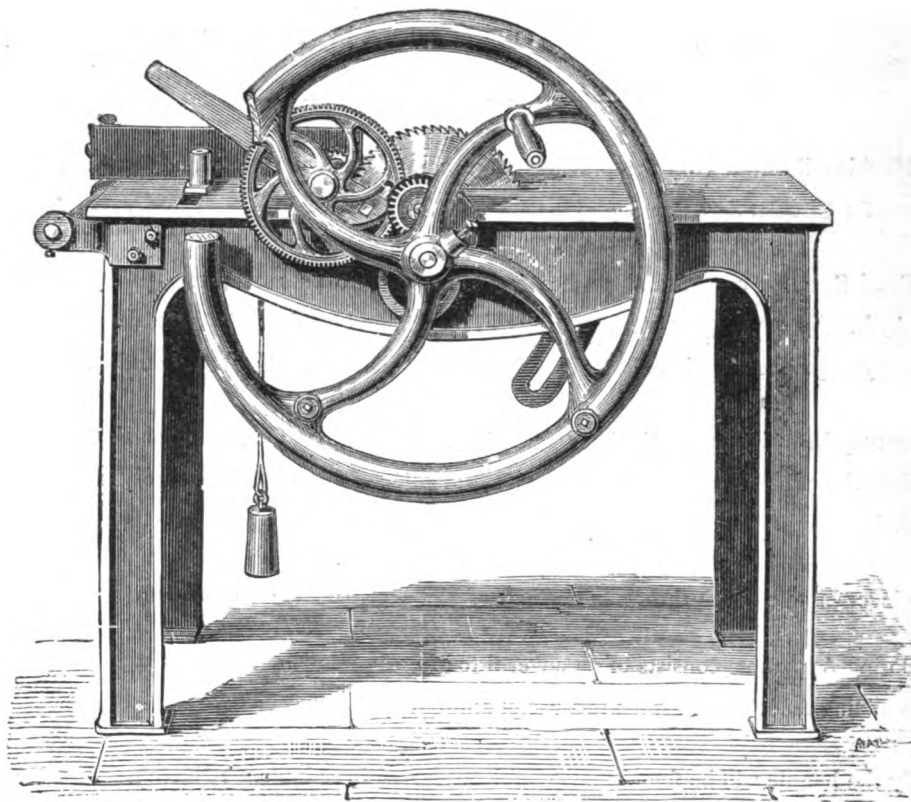
The Boring Apparatus consists of an auger fitted into the end of the spindle, a rising and falling bed, and a sliding fence-plate. This is a useful and handy adjunct.

Usually the handle will be found most useful on the main spindle. Sometimes, however, greater speed is desired. For this purpose there is a second spindle, to either or both ends of which a handle may be attached, as at E. By this means the large cog-wheel is worked into a smaller cog on the main spindle, thereby increasing the rate of speed three times. Steam or Horse Power, where available, may advantageously be applied to this spindle, and for the purpose Fast-and-Loose Pulleys are supplied.

F. W. REYNOLDS AND CO.,
73, SOUTHWARK STREET, AND THE GROVE, LONDON, S.E.

THE "IMPERIAL"

*Hand-power, Self-feeding, Patent Circular Sawing,
Grooving, Tenoning, and Rebating Machine.*



Price, with 15-inch Circular Saw for Ripping, 9-inch ditto for Tenoning and Rebating, two extra cogs, rollers, and bearings	} £12 12 0
„ ditto, ditto, with Rising and Falling Spindle	14 10 0
Fast-and-Loose Pulleys for Steam Power, extra	1 0 0

F. W. REYNOLDS AND CO.,
73, SOUTHWARK STREET, AND THE GROVE, LONDON, S.E.

THE "IMPERIAL"

HAND-POWER, SELF-FEEDING, PATENT CIRCULAR SAWING, GROOVING, TENONING, AND REBATING MACHINE.

The Machine illustrated on the previous page is a very handy description of Saw Bench. It will cut timber up to 4½ inches; by lowering or raising the spindle may be adapted for Grooving, Tenoning, or Rebating.

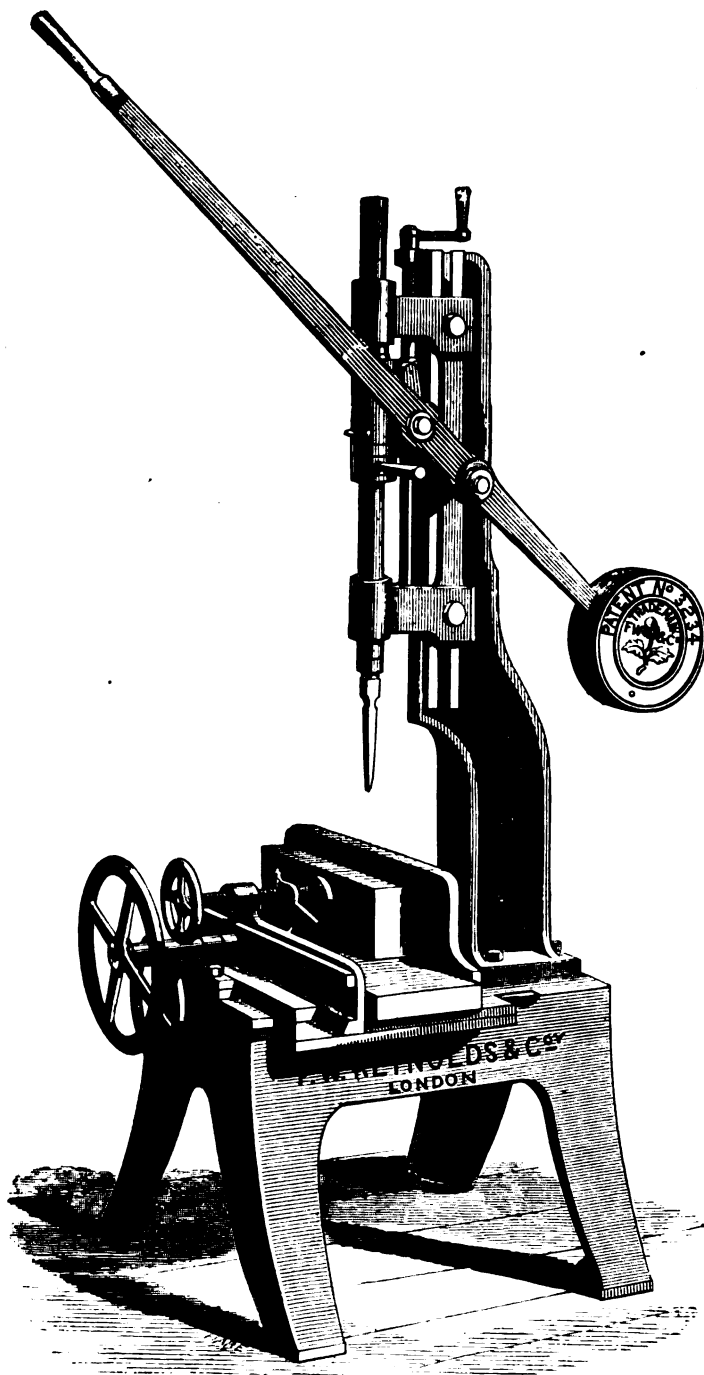
It is fitted with an automatic feed motion, by means of which the timber is brought up to the saw, thus saving the necessity of a man to feed.

For Bevel Cutting the fence plate may be set to any angle.

With the Machine are supplied two extra cogs for changing the rate of feed motion, according to the depth of timber being cut; and also rollers and bearings for long stuff.

F. W. REYNOLDS AND CO.,
73, SOUTHWARK STREET, AND THE GROVE, LONDON, S. E.

THE "MONARCH" PATENT MORTISING MACHINE.



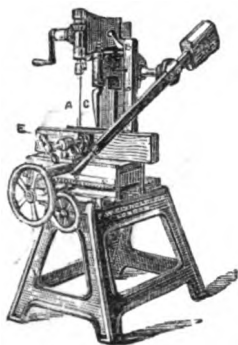
The Machine illustrated on this page is a strong well-made Mortising Machine. The wood to be mortised is fixed in the bed by means of the clamp screw, and the bed is then adjusted by the two larger screws under the chisel. The wood is then mortised and the core driven in the ordinary way. The chisel is held in position by means of an improved arrangement, which prevents its turning in the mortise, and thus spoiling the work.

Price, complete, with Chisels and Coredrivers, £12.

F. W. REYNOLDS AND CO.,
73, SOUTHWARK STREET, AND THE GROVE, LONDON, S.E.

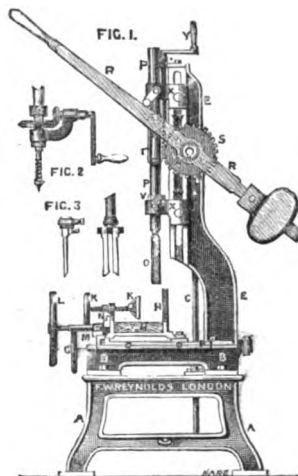
THE "IMPERIAL" PATENT MORTISING
AND BORING MACHINE.

Complete with Chisels and Coredrivers.



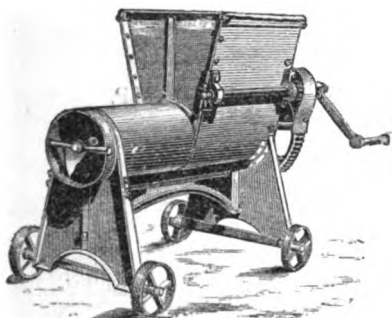
The above is a light and handy Machine. A is an auger for boring, and C a chisel for mortising.

THE "ROYAL" PATENT COMBINED
MORTISING, BORING, AND TENONING
MACHINE.



Price, with Chisels and Coredrivers	£15	15	0
Tenoning Tool (Fig. 3), extra ..	2	0	0
Boring Apparatus (Fig. 2), extra ..	3	5	0
Complete	21	0	0

THE "LONDON" IRON MORTAR-
MIXING MILL.



The hopper being filled with the materials, the spindle in centre of cylinder, having 14 wrought-iron blades, is set in motion by the handle, and the mortar is ready for use when discharged from the outlet. One man with this Machine can keep twenty men at work.

Price £10 10s.

SHUTE'S PATENT MITREING MACHINE.



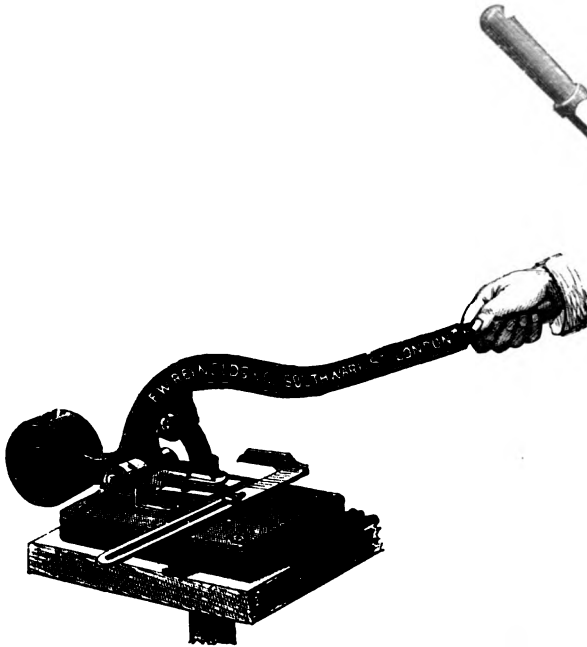
This Machine will cut a perfect Mitre in Mouldings up to 5½ inches wide at one stroke.

Price £3 5s.

F. W. REYNOLDS AND CO.,
73, SOUTHWARK STREET, AND THE GROVE, LONDON, S.E.

U

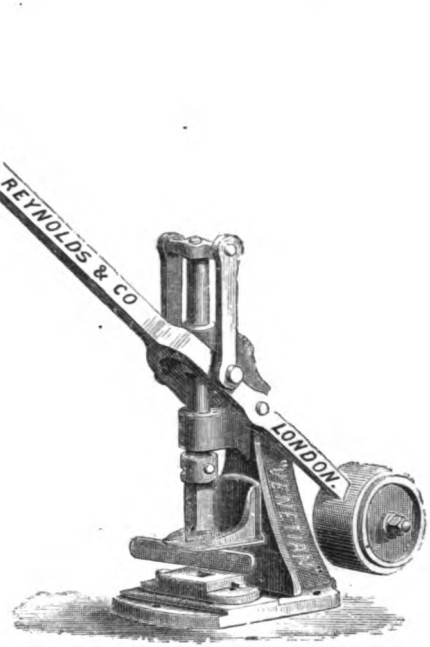
THE "UNIVERSAL" BLIND-LATH
PUNCHING MACHINE.



This Machine is made in two sizes for No. 1 holes, $\frac{7}{8}$ " $\times$ $\frac{5}{16}$ "; No. 2 holes, 1" $\times$ $\frac{3}{8}$ ". It punches the cord-holes in Venetian - Blind Laths perfectly clean, and without splitting.

Price £2 2s.

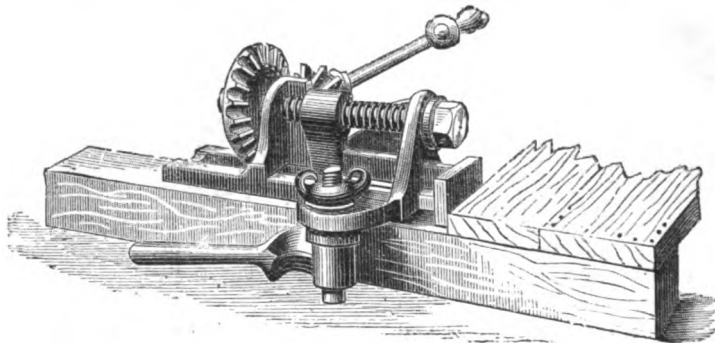
THE "UNIVERSAL" BLIND-PULLEY-
HEAD MORTISING MACHINE.



This Machine makes a perfect and clean mortise by merely depressing the lever.

Price £4 4s.

THE "IMPERIAL" IMPROVED MALLEABLE FLOOR-CRAMP.



A useful and powerful Floor-Cramp, made throughout of Malleable Iron.

Price £1 6s.

F. W. REYNOLDS AND CO.,
73, SOUTHWARK STREET, AND THE GROVE, LONDON, S.E.

HAND AND STEAM MACHINERY.

CIRCULAR-SAW BENCHES FOR STEAM POWER, FROM £12 10s. TO £100 0 0

BAND-SAW TABLES FOR STEAM POWER, FROM £13 10s. TO £52 0 0

THE "PREMIER" MORTISING MACHINE, FOR MORTISING AT AN ANGLE .. £25 0 0

IMPROVED GENERAL JOINER, WITH CIRCULAR SAW AND BAND SAW, TO
PLANE, MOULD, GROOVE, AND TENON, FROM £105 TO £200 0 0

SLATE-HOLING MACHINES, SINGLE, £2 2s., DOUBLE £6 15 0

DRILLING MACHINES, PILLAR, BENCH, AND ANGULAR, FROM £5 0 0

MORTAR AND LOAM MILLS, FROM £52 10s. TO £125 0 0

PAINT GRINDING AND MIXING MILLS, FROM 17s. 6d. TO £39 0 0

GRINDSTONES, FROM £1 2s. 6d. TO £8 18 6

TIRE-BENDING MACHINE £5 0 0

LIFTING-JACKS, FROM 17s. 6d. TO £18 10 0

PULLEY BLOCKS, CRANES, CRABS, AND BUILDERS' APPLIANCES IN GREAT
VARIETY.

Prices, Illustrations, and Descriptions of above on application.

F. W. R. and Co. send any Machine on One Month's Trial to any place in the United Kingdom
without Charge.

F. W. REYNOLDS AND CO.,
73, SOUTHWARK STREET, AND THE GROVE, LONDON, S.E.

U 2

ARTHUR RIGG, ENGINEER,

1, FENCHURCH STREET, LONDON, E.C.
**MANUFACTURER OF TURBINES, WATER WHEELS, HYDRAULIC ENGINES,
WINCHES, CRANES, HOISTS AND LIFTS, &c.**

**High-Pressure, Condensing, Single or Compound Steam-Engines.
HORIZONTAL OR VERTICAL BOILERS.**

PATENT COAL TIPPING, SCREENING, AND LOADING APPARATUS.

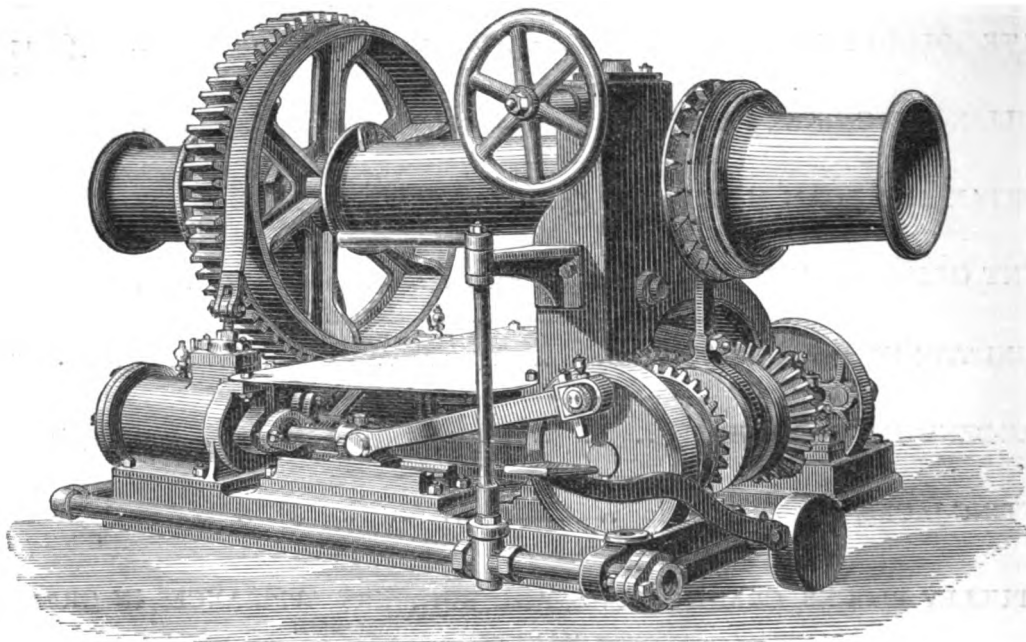
Machinery for Manufacturing Gunpowder or Guncotton.
SPECIAL APPLIANCES ARRANGED FOR ANY PURPOSES.

EXAMINATIONS AND REPORTS MADE ON ENGINES OR WORKS, &c.

Patents taken out: Machinery purchased, inspected, or examined, and arranged for export.

The Prices, where given, are intended only as a general guide, and are subject to alteration.

HOISTING MACHINERY.



This Winch is adapted for use on board ship or otherwise, and it is driven by a pair of horizontal Engines. It is more compact than any other of equal power, and works noiselessly, without vibration, being in this respect especially well adapted for use in passenger steamers.

On the Engine Shaft there is a Cone Friction Clutch of ample power, which, by being placed in any one of three positions, starts, stops, or reverses the barrel. The Machine is strong and durable, well made, and not liable to get out of order.

NOTE.—A chain wheel may be applied to the main barrel to drive the capstan, or a large drum may be fixed instead of one of the ordinary surging barrels, for the purpose of lifting light loads rapidly.

PRICES.

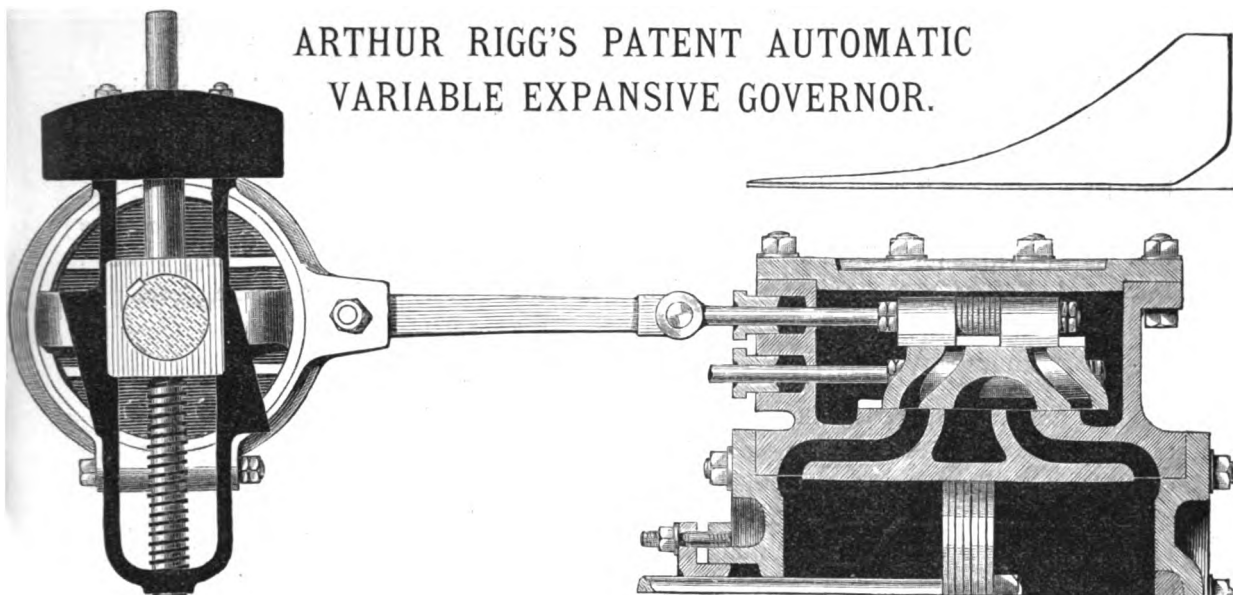
Winch with Two Cylinders, each 7 inches diameter, as shown by the Illustration . . . £85
 „ „ 8-inch Cylinders, and worm gearing . . . £100

Prices for other sizes or special arrangements on application.

Jib or Travelling Cranes for Foundries, Steam Hammers, &c.
Hydraulic Cranes, or Direct-acting Lifts, for Docks, Warehouses, &c.

ARTHUR RIGG,
ENGINEER, 1, FENCHURCH STREET, LONDON, E.C.

ARTHUR RIGG'S PATENT AUTOMATIC VARIABLE EXPANSIVE GOVERNOR.



Variable Expansion under the control of a Governor is an essential element in any complete plan for securing the economical working of a Steam Engine ; for even with an inconstant load this method admits only the exact amount of steam required at full pressure, and gains every possible advantage from its expansion.

The Patent Governor illustrated fulfils these objects in the simplest and most direct manner, and it can be applied with ease to existing Engines. There is a weighted frame sliding radially on the Engine Shaft, turning round with it, and controlled as to position by centrifugal force overcoming the resistance of a spring. Thus, the distance of the Governor Ball from the centre of Engine Shaft depends upon the number of revolutions per minute. Attached to the Governor Frame are Inclines, which fit against projections on an Expansion Valve Eccentric, whose Stroke, variable by the Governor, regulates the expansion of steam within any desired limits; and this simple arrangement, consisting of only three or four parts, gives practically as good a result, and effects as great an economy in fuel, as the most complicated Governors known. This Governor can be seen at work in London.

All the Engines quoted in the following Tables are supplied with these Governors, and capable of working to a pressure of one hundred pounds per square inch ; all above 6 horse-power have Steam-jacketed Cylinders, Felted and Lagged, they are supplied with extra heavy Fly-Wheels and every requisite for a first-class Engine, and they run steadily with a high rate of expansion.

Feed Pumps not supplied with the Engines unless specially ordered.

Higher power can be got than given in the Table below, but it is not recommended.

HIGH-PRESSURE BRIGHT HORIZONTAL STEAM-ENGINES.

Nominal Horse-power.	Indicated Horse-power.	Diameter of Cylinder.	Piston Stroke.	Price.	Nominal Horse-power.	Indicated Horse-power.	Diameter of Cylinder.	Piston Stroke.	Price.
		inches.	inches.	£			inches.	inches.	£
4	16	6	7	80	10	40	10	15	160
5	20	7	10	90	12	50	12	18	190
6	25	8	14	110	16	65	14	20	240
8	35	9	15	135	20	80	16	24	300

ARTHUR RIGG,
ENGINEER, 1, FENCHURCH STREET, LONDON, E.C.

SPECIAL ENGINE FOR EXPORTATION.

This Engine has an 8-inch Cylinder with 24-inch Stroke, and makes 60 Revolutions per minute. It is supplied with an ordinary Governor and Throttle Valve, Feed Pump and Water Heater, a special Disengaging Gear for stopping instantly, and it is so arranged as to be erected either right or left hand; the Fly Wheel is 8 feet diameter, heavy, and made in halves for convenience of transport.

The Boiler is self-contained, 10 feet long and 4 feet 6 inches in diameter, arranged to reverse with the Engine, and supplied with all necessary Fittings, and a Wrought-Iron Chimney, a Steam Dome, and all Pipes for connections with Engine. Price of Engine and Boiler, complete, £400.

CONDENSING AND COMPOUND ENGINES.

Good Condensing Engines will produce the same horse-power with about half the coal necessary to drive the best High-Pressure Non-condensing Engines, and this will always repay their additional cost. These Engines are all supplied with ARTHUR RIGG'S PATENT VARIABLE EXPANSION GOVERNOR, a set of Slide and Expansion Valves to each Cylinder, both of which are Steam Jacketed, Felted, and Lagged, and each Engine is supplied with a Donkey Pump or Injector: but there is no Feed Pump on the Engine unless specially ordered.

COMPOUND CONDENSING STEAM-ENGINES.

Nominal Horse-power.	Indicated Horse-power.	Diameter of High-pressure Cylinder.	Diameter of Low-pressure Cylinder.	Length of Stroke.	Engine with Air Pump and ordinary Condenser.	Surface Condenser extra.
25	80	inches. 9	inches. 15	inches. 20	£ 450	£ 65
35	100	10	18	24	560	100
45	150	12	20	30	700	150

None of the Prices include packing, which averages about 5 per cent.

Boilers amount to about the same price as Engines, but special quotations will be given on application.

WINDING ENGINES.

The smaller sizes arranged to run at a high speed and drive a Drum by Worm and Worm Wheel. This system avoids the necessity for Brakes, enables the Drum to be stopped instantly, and ensures safety.

Price of Winding Engine with Two 7-inch Cylinders, Reversing Gear, } £200
Worm Wheel and Drum complete }

Estimates for other sizes on application.

MARINE ENGINES,

Simple or Compound, to run at high speed without vibration, driving an Improved Patent Screw-Propeller, and provided with Patent Turning Gear, which avoids any difficulty in starting, or any irregularity in motion.

PUMPING ENGINES,

For Mines, Quarries, &c., and other purposes.

ARTHUR RIGG,
ENGINEER, 1, FENCHURCH STREET, LONDON, E.C.

HYDRAULIC MACHINERY.

For mechanical processes, such as Riveting, Shearing, Punching, &c., where heavy pressures are required through short distances, hydraulic power can be applied with remarkable ease and economy. The illustration shows Messrs. MCKAY AND MACGEORGE'S PATENT HYDRAULIC RIVETTER, which requires only unskilled labour to work it, and as the Plates are held together and Rivets compressed to fill their holes entirely, the work is done both cheaper and better than is ever possible by hand.

One of the largest Machines, giving 60 tons on the Rivet, can be seen working at the Mill-wall Docks Engineering Works, London, and it is used for rivetting the heaviest class of marine-boiler work, and also for straightening or bending ships' beams and heavy wrought-iron work. This application renders it a most useful machine in any shipbuilder's yard.

In order to economize power, a small ram first brings the dies together and full pressure comes on the larger ram, thus the work is done with less than half the power required for a Steam Rivetter.

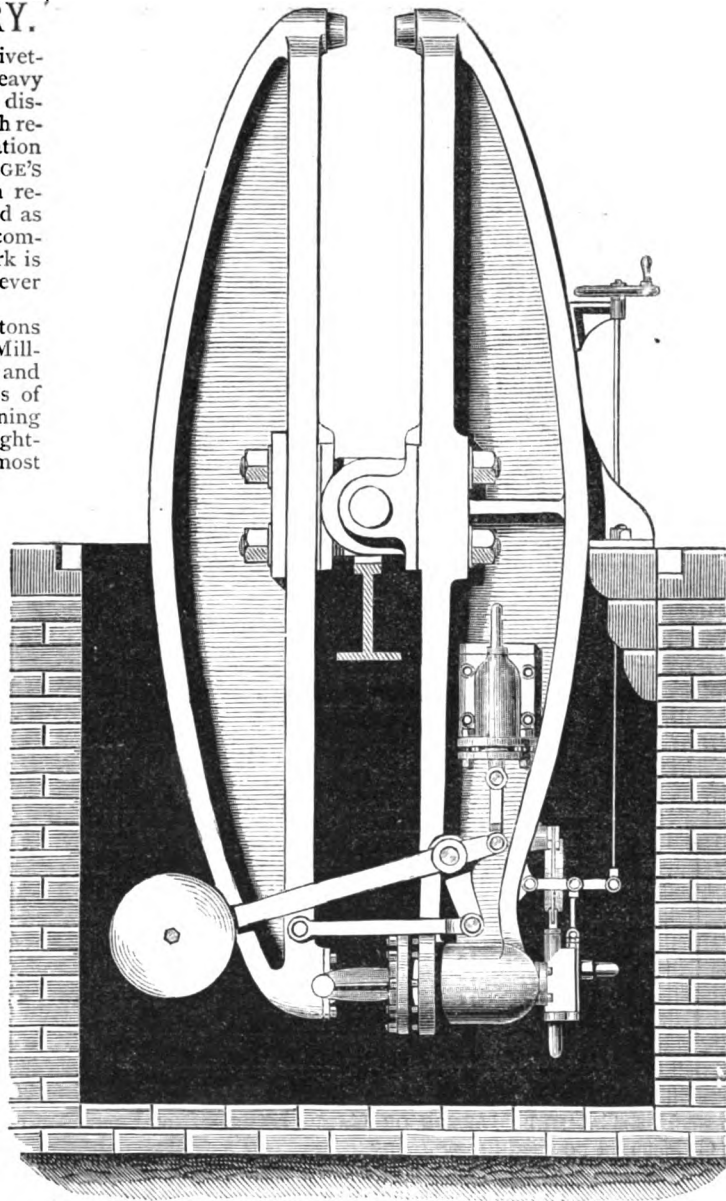
**SPECIAL MACHINES ARRANGED EITHER
FIXED OR PORTABLE.**

ARTHUR RIGG'S PATENT HYDRAULIC PUMPS.

These Pumps have one Ram and two Valves only, and give a continuous stream. They may be used to fill an accumulator or to supply Hydraulic Presses. A Disengaging Apparatus can also be applied to throw the Pump out of action when the Accumulator is full, and start again as it descends.

SPECIAL HYDRAULIC MACHINERY.

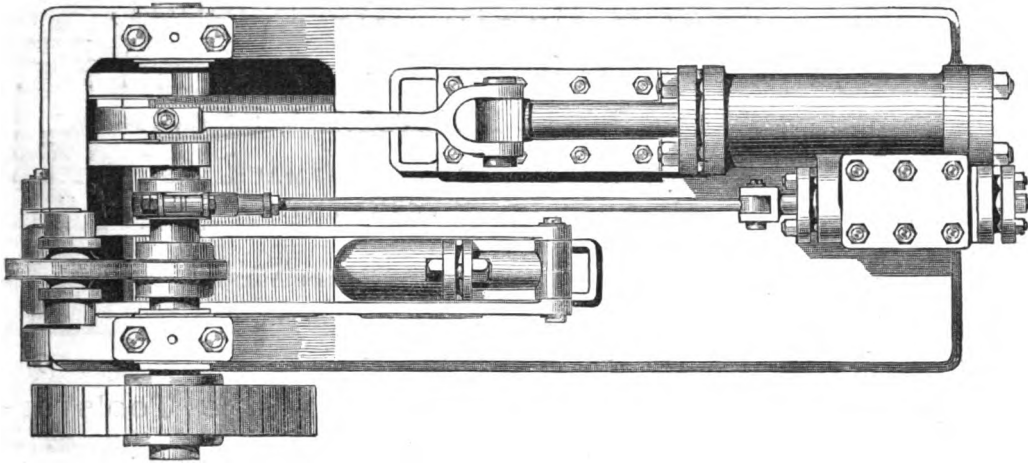
Presses for making Lead Pipes, for extracting Oil, and compressing Paraffine or Gunpowder; Accumulators of a new design; Hydraulic Rams and Pumps of all kinds; Centrifugal Pumps or Scoop Wheels for raising Water; and any other kind of Hydraulic Machinery.



MESSRS. MCKAY AND MACGEORGE'S PATENT HYDRAULIC RIVETTER,
MANUFACTURED BY ARTHUR RIGG, ENGINEER, 1, FENCHURCH STREET, LONDON, E.C.

Diameter of Rivet.		Pressure on Rivet.	Depth of Gap Opening.	Rivetter and Beam Bender.	Accumulator and Pump for working Two Machines.
For Girders.	For Boilers.				
inch.	inch.	tons.	inches.	£	£
$\frac{1}{2}$	$\frac{3}{8}$	30	54	250	200
$1\frac{1}{4}$	1	45	54	300	230
$1\frac{3}{4}$	$1\frac{1}{2}$	60	60	450	300

ARTHUR RIGG,
ENGINEER, 1, FENCHURCH STREET, LONDON, E.C.

HYDRAULIC ENGINES.

For very high pressures Hydraulic Engines are generally more desirable than Turbines, and in such cases Water Wheels are wholly inapplicable. Also wherever power is required at various places in a large area it is more economical to convey it by high-pressure Water Pipes than by Shafting or any other method, notwithstanding the necessity for pumping the supply for Hydraulic power by a central Engine.

Another useful application of Hydraulic Engines is where an abundant Waterfall exists at an inconvenient place for establishing a mill, or as in the manufacture of Gunpowder where Steam power may be dangerous. In any of these cases high-pressure water may be pumped, conveyed, and used to drive Hydraulic Engines.

All working parts of the Patent Hydraulic Engine illustrated are made of gun metal in the Engines marked A, but a cheaper Engine is made with cast-iron working parts, and prices for it are given under the heading B, and it consists of one Cylinder and Slide Valve only: uniform rotary motion being secured by a Cam and Compensating Roller. The Slide Valve used is applicable to any other Hydraulic Machinery, and its faces do not cut with clean water however high the pressure.

PRICE LIST OF PATENT HYDRAULIC ENGINES.

Diameter of Cylinder.	Length of Stroke.	A To work up to 1000 lb. per Square Inch. Gun Metal.	B To work up to 100 lb. per Square Inch. Cast Iron.	To 1000 lb. per Square Inch.	
				A Engine alone.	Engine, with Capstan and Platform.
inches.	inches.	£	£	£	£
2	6	35	26	65	110
3	9	50	35	90	155
4	12	80	60	150	230

TURBINES AND WATER WHEELS.

Turbines can be used for any fall of water, from 1 foot upwards, and they are made with Spindles, horizontal or vertical, and to work at the bottom of a fall or above it, either for a constant or variable load. They are not checked by tail water like Water Wheels, and they work noiselessly, and often for years together without repairs. These Turbines are provided with a Water Lubricated Footstep of improved construction, and are made of iron or gun metal.

COMBINED MILLSTONE AND TURBINE.—This useful arrangement consists of a Vertical Spindle, with a Millstone at its upper end and a Turbine below, and it costs from £100 to £200.

WATER WHEELS.—Specially arranged for exportation with Wrought-Iron Turned Shaft, Cast-Iron Shrouds and Pedestals, and Wooden Ventilating Buckets.

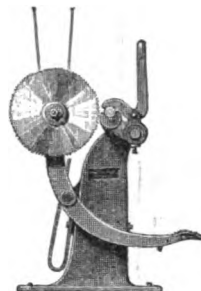
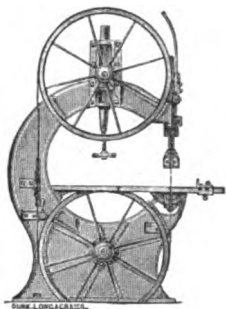
Prices quoted for Turbines or Water Wheels, Gearing, &c., on receipt of information: Vertical fall and quantity of water available, or horse-power required.

ARTHUR RIGG,
ENGINEER, 1, FENCHURCH STREET, LONDON, E.C.

RICHARDS, LONDON, AND KELLEY, ENGINEERS,

ATLANTIC WORKS, PHILADELPHIA, U.S.A.,
CONSTRUCTORS OF WOOD-WORKING MACHINES
FOR THE U.S. GOVERNMENT.

JOHN RICHARDS AND CO., EUROPEAN AGENTS,
10, JOHN STREET, ADELPHI, LONDON.



Various Manufactures for which Machine Tools are
furnished:

CABINETMAKING AND JOINER WORK.
WAGONS, CARRIAGES, AND SLEIGHS.
RAILWAY CARRIAGES AND LOCOMOTIVE CABS.
SAWS, EDGE TOOLS, AND PLANE IRONS.
CARRIAGE WHEELS, SPOKES, AND RIMS.
BARRELS, TUBS, AND PAILS.
NUTS, SCREW BOLTS, NAILS, AND RIVETS.
SHIP AND BOAT BUILDING, WOOD AND IRON
TOOLS.
SEWING MACHINES, BOTH IRON AND WOOD
WORK.
REAPING, MOWING, AND THRASHING MA-
CHINES.
PLOUGHS, HOES, RAKES, AND FORKS.

FIREARMS, BOTH IRON AND WOOD TOOLS.
AXE, PICK, SLEDGE, AND HAMMER HANDLES.
SADDLE-TREES, HAMES, AND SHOE LASTS.
BROOM AND HOE HANDLES, WOODEN RODS.
VENEERS, SCALEBOARDS, AND WOOD PAPER.
BOXES, CHESTS, AND PACKING CASES.
OVAL PICTURE-FRAMES, AND IRREGULAR
MOULDING.
BENT WOOD-WORK FOR CARRIAGES, CHAIRS,
&c.
PENCILS, DOWELL RODS, TOYS, &c.
BOBBINS, TOOL HANDLES, SPOUTS, BUNGS,
&c.

STANDARD MACHINES FOR SAWING, PLANING, TURNING, MORTISING,
TENONING, BORING, &c.

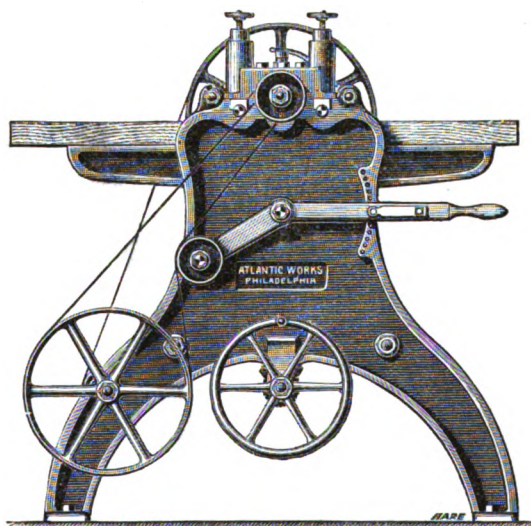
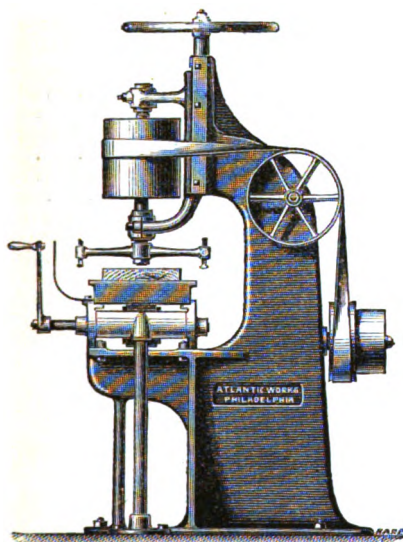
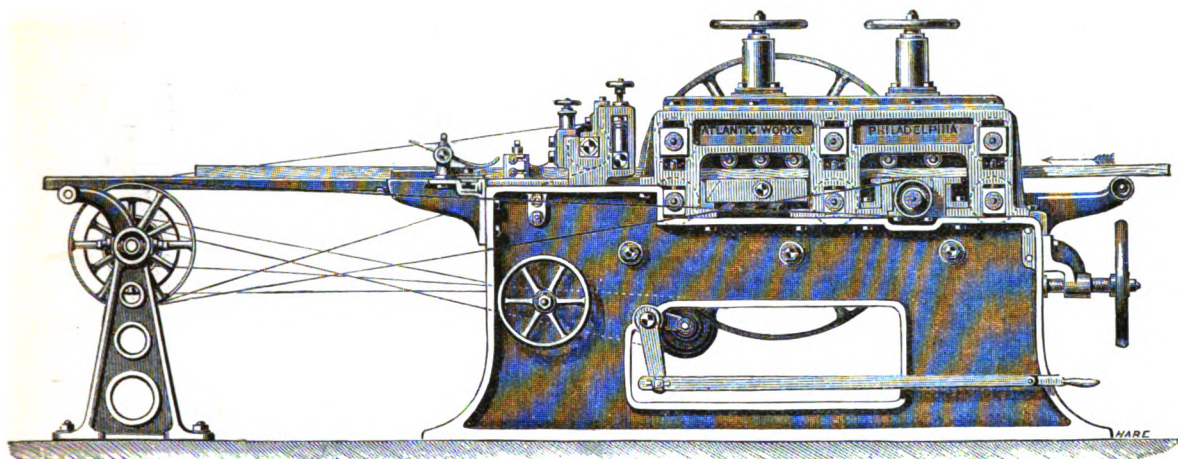
ENGINE LATHES, PLANING AND DRILLING MACHINES,

FOR PERFORMING REPAIR WORK IN WOOD FACTORIES, TO OPERATE BY HAND, OR WITH POWER.

For Price Lists, Engravings, Estimates, and Specifications, address as above.

RICHARDS, LONDON, AND KELLEY,
ENGINEERS, ATLANTIC WORKS, PHILADELPHIA, U.S.A.
AGENCY: 10, JOHN STREET, ADELPHI, LONDON.

PLANING MACHINES.



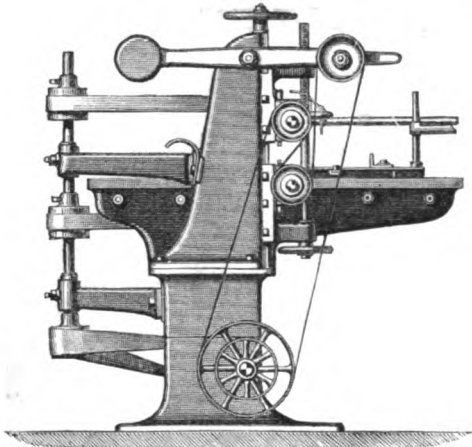
Surface Planing Machines	from	£50 to £500
Floor-board Planing Machines	„	£300 „ £450
Planing and Matching Machines	„	£90 „ £400
Carriage Planing Machines (wood frames)	„	£55 „ £200
Carriage Planing Machines (iron frames)	„	£100 „ £500

Special Planing Machines for pattern work, scantlings, volute forms, barrel staves, cigar boxes, panels, scraping, &c., &c.

Machinery delivered in Liverpool or Antwerp. No extra charge for essential details.

RICHARDS, LONDON, AND KELLEY,
ENGINEERS, ATLANTIC WORKS, PHILADELPHIA, U.S.A.
AGENCY: 10, JOHN STREET, ADELPHI, LONDON.

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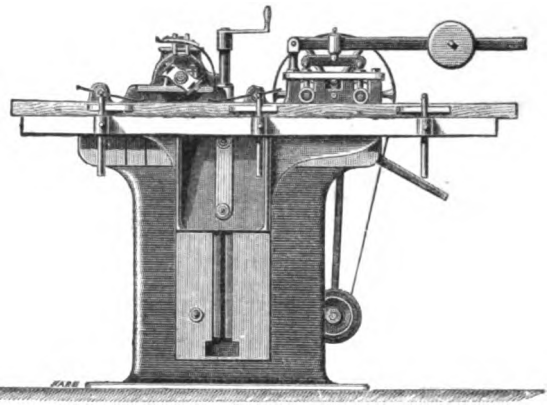


TENONING MACHINES.

MACHINES FOR JOINER AND CABINET WORK.

No.		Price.
1	with single cutter heads, without scribing spindles, £30	30
2	double " with " " " "	38
3	" " " without " " " "	35
4	" " " with " " " "	44
5	single " " " " " "	55
6	" " " without " " " "	45
7	double " " " " " "	70

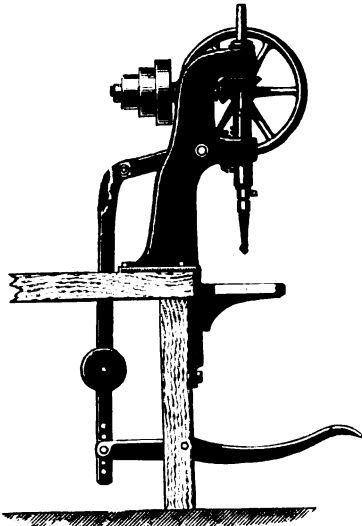
Machines Nos. 1 to 5 have wooden frames, are durable and effective, but inferior to iron-frame Machines Nos. 5, 6, and 7. No. 7 is a finely-constructed Machine; the spindles adjust in all directions; the bearings, twelve in number, are of brass; the carriages are moved on rollers.



MOULDING MACHINES.

Constructed wholly of metal, and furnished with cutter heads, one set of cutters, and other details. The cutter heads are overhung on Machines to No. 8, but have out-bearings.

No.		Price.
1	Sash-Moulding Machine	£40
2	planes 3 sides to 4 inches, 1 side to 6 inches . . .	53
3	" 4 " 4 " " 6 " . . .	58
4	" 3 " 7 " wide, 4 inches thick . . .	85
5	" 4 " 7 " " 4 " . . .	95
6	" 3 " 8 " " 4 " . . .	105
7	" 4 " 8 " " 4 " . . .	115
8	" mouldings or floor-boards to 10 inches wide, 5 spindles, weight 5000 lb.	250
9	for planing volute or spiral forms, planes to 3 inches diameter, 6 sets of cutters	95



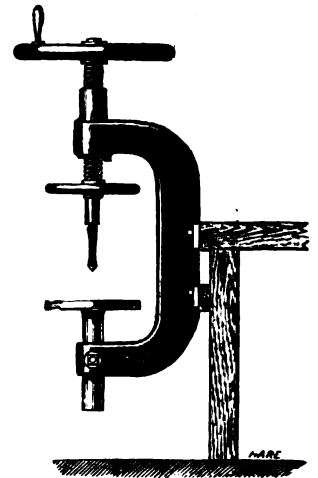
METAL-DRILLING MACHINES.

FOR HAND OR POWER.

All sizes and kinds, at prices from £10 to £100, for Machine Shops, Blacksmith Shops, and for Repair Work.

Machinery delivered in Liverpool or Antwerp.

NO EXTRA CHARGE FOR ESSENTIAL DETAILS.



RICHARDS, LONDON, AND KELLEY,
ENGINEERS, ATLANTIC WORKS, PHILADELPHIA, U.S.A.
AGENCY: 10, JOHN STREET, ADELPHI, LONDON.

BAND-SAWING MACHINES.

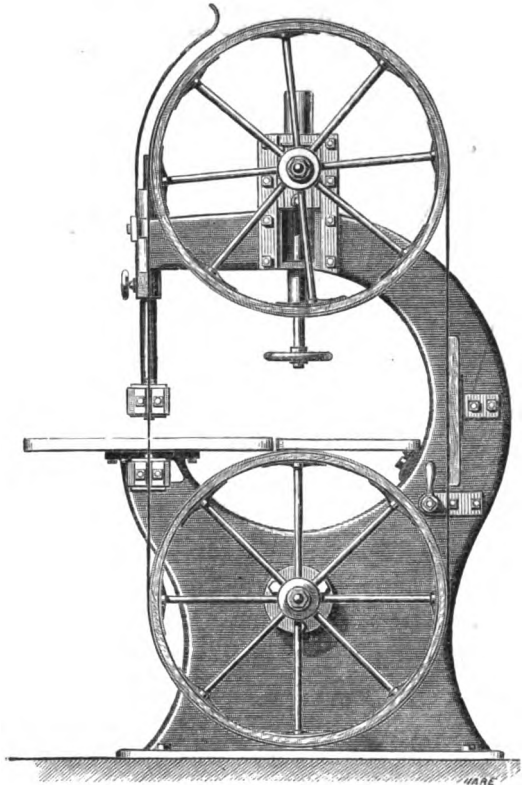
OVER 500 NOW IN USE.

No. 1	Hand feed only,	wheels 36 inches diameter,	£50
„ 2	„ „ „	„ 40 „ „	70
„ 2	Hand and power feed, „	40 „ „	95
„ 3	Hand feed only,	„ 44 „ „	90
„ 3	Hand and power feed, „	44 „ „	120
„ 4	Hand feed only,	„ 48 „ „	150
„ 4	Power feeding,	„ 48 „ „	175
„ 5	„ „ „	„ 54 „ „	200
„ 6	„ „ „	„ 72 „ „	400
„ 6	Without feed	„ 72 „ „	300

Hand Slitting Gauge for Nos. 1, 2, and 3, £2 extra.

Band-Saw Mills of any size for sawing logs, deals, ship timbers, &c., to estimate.

Wheels more than 4 feet diameter are made of wrought iron; those of smaller size are made of wrought iron and wood, or of cast iron, as may be wanted.

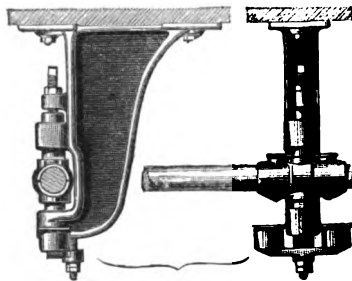


No. 1 BAND SAW.

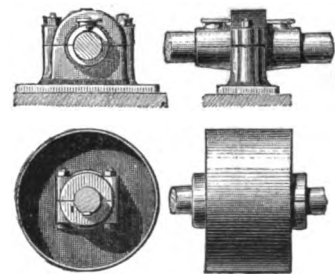
IMPROVED FITTINGS FOR LINE SHAFTS.



Post Bracket, with bearings, adjustable and pivoted.



Suspension Bracket, with pivoted and adjustable bearings.



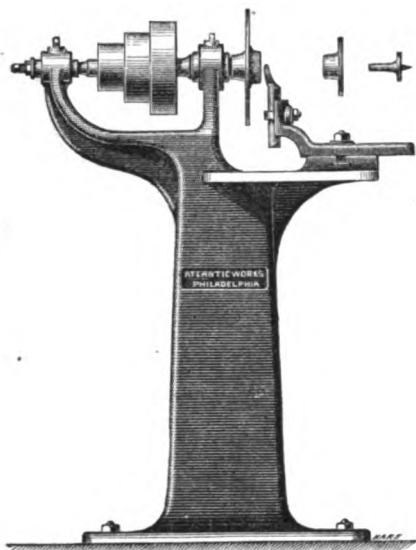
Pivot Pillow Block, and improved clamp shaft coupling.

Special Estimates made for Line Shafts and Fittings.

Machinery delivered in Liverpool or Antwerp. No extra charge for essential details.

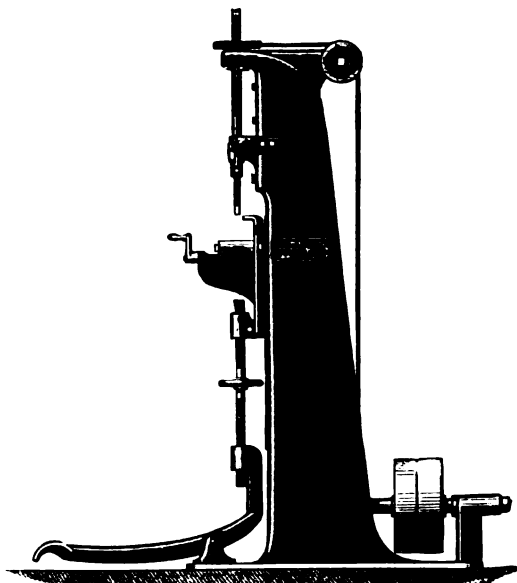
RICHARDS, LONDON, AND KELLEY,
ENGINEERS, ATLANTIC WORKS, PHILADELPHIA, U.S.A.
AGENCY: 10, JOHN STREET, ADELPHI, LONDON.

MISCELLANEOUS MACHINES.



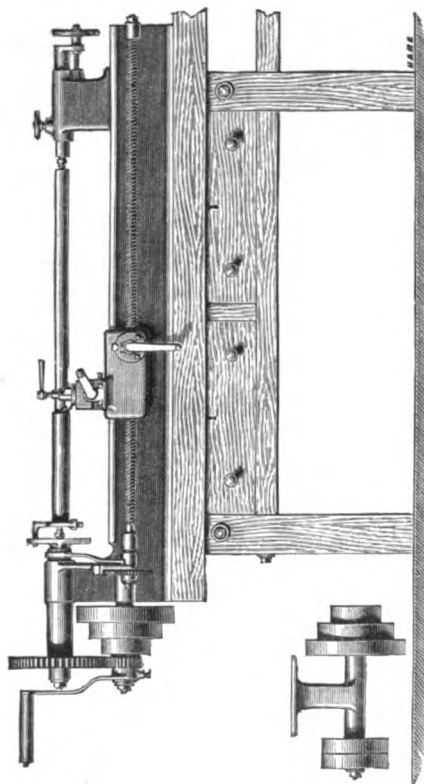
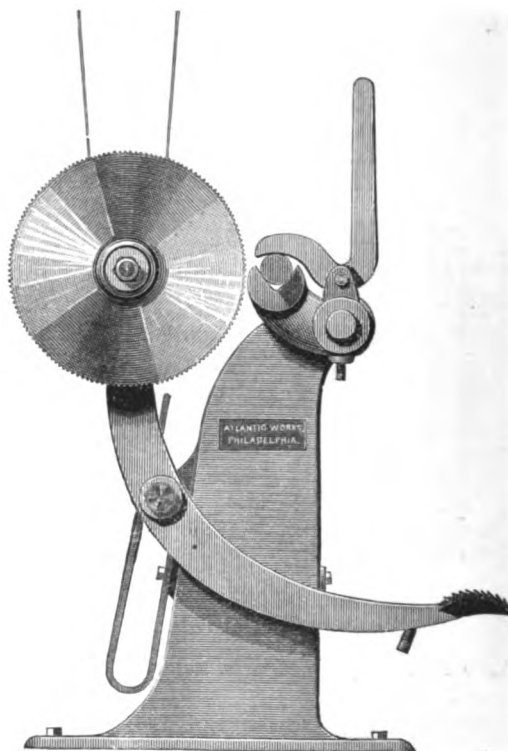
FACE LATHE FOR PATTERNS.

Price £30.



MORTISING MACHINES.

From £30 to £200.

ENGINE LATHE, for hand or power, turns 12 inches diameter.
To turn 4 feet long. Price £25.

SAW, to cut off hot iron. Price £25.

Machinery delivered in Liverpool or Antwerp. No extra charge for essential details.

RICHARDS, LONDON, AND KELLEY,
ENGINEERS, ATLANTIC WORKS, PHILADELPHIA, U.S.A.
AGENCY: 10, JOHN STREET, ADELPHI, LONDON.

PRICE LIST OF VARIOUS MACHINES.

WOOD-TURNING MACHINERY.

Plain Wood-Turning Lathes, to stand on wooden frames, furnished with countershafts, rests, and points.

No. 1.	Turns to 12 in. diam.	.. .. .	£ 12
" 2.	" 16 in. "	" .. .	14
" 3.	" 20 in. "	" .. .	16
" 4.	" 24 in. "	" .. .	18
" 5.	" 24 in. "	with face plate at both ends ..	20
" 6.	" 24 in. "	extra heavy dble. end	30

AUTOMATIC LATHES FOR WOOD TURNING.

For turning runds, handles, chair spindles, and other cylindrical pieces, taper or ornamental. The frames are of iron, and the prices include countershafts.

No. 1.	Turns to 3 feet long, 2 in. diameter, price ..	£ 40
" 2.	" 4½ " " " " " "	50
" 3.	" 6 " " " " " "	60
" 4.	Plain Lathe for long handles, turns to 7½ feet long ..	40
Gauge Lathes with Shearing Cutters from £100 to £150.		£
Lathe for elliptical handles, with cutters or saws ..		50
Lathe for turning the spokes of carriage wheels ..		85
Variety Lathe for bobbins, wooden boxes, &c. ..		85
Large " " " " " " " " " " " "		95
Lathe to turn spiral mouldings to 3 in. diameter ..		95
Slide Rest to turn long handles and taper forms, arranged to be used with a common Lathe ..		8

SHAPING MACHINES FOR WOOD.

The prices include a countershaft and two sets of heads and straight cutters with each Machine—additional cutters are extra.

No. 1.	with 1½ and 2 in. cutter heads, weight 500 lb.	£ 40
" 2.	" 2 " 2½ in. " " " " " "	975 " 50
" 3.	" 2 " 2½ in. " " " " " "	1200 " 60
" 4.	" 1½ " 1½ in. " " " " " "	one spindle .. 25

ROD LATHES, OR TURNING MANDRILS.

To turn parallel cylindrical pieces, such as curtain rollers, pins, or chair braces.

No. 1.	Turns ¾, 1, and 1½ in. diam., hand feeding	£ 5 10
" 2.	" ¾, 1, and 1½ in. " " " " " "	6 0
" 3.	" 1½, 1½, and 1½ in. diam. " " " " " "	7 0
" 4.	" 1½, 1½, and 1½ in. " " " " " "	7 10
" 5.	" 1½, 1½, and 2 in. " " " " " "	8 0
" 6.	" to 1½ in. diam., with feed rolls ..	20 0
" 7.	" to 2 in. " " " " " "	22 0
" 8.	" to 3 in. " " " " " "	28 0

Nos. 6, 7, and 8 have three cutter heads each, and are furnished with countershafts.

MACHINERY FOR MAKING BARRELS.

No. 1.	Machine to plane sawed staves	£ 66
" 2.	" " split staves	132
" 3.	" " barrel heads	66
" 4.	" shape and turn heads	70
" 5.	" plane and joint split heading	75
" 6.	" joint and dowell heading	50
" 7.	" cut staves to equal lengths	20
" 8.	" joint sawed staves	100
" 10.	" joint split staves	20
" 11.	" plane and level barrels	66
" 12.	" chamfer, croze, and howel	100
" 13.	" turn and smooth barrels	60
" 14.	" for making iron hoops	50
" 15.	" sawing heads for barrels or shingles	65
" 16.	" sawing heads for barrels or shingles	60
" 17.	" cutting barrel staves	50
" 18.	" setting up forms for barrels, each ..	5
" 19.	" to drive hoops by power	132
" 20.	Elevator for barrels in process	45

SANDPAPERING MACHINES FOR WOOD.

No. 1.	Machine with swing frame, discs 8 in. diam., without fan or table	£ 8
" 2.	Machine with swing frame, discs 8 in. diam., with fan, countershaft, table, and framing complete	40
" 3.	Machine, 36 to 40 inches wide, to receive a whole door, framing of wood	80
" 4.	Belt Machine, with exhausting fan and framing complete	60
" 5.	Machine (Barker and Ransome's Patent), to receive a whole door, with pneumatic fan, hand feeding, iron frame	150
" 6.	Machine (Barker and Ransome's Patent), with a carriage, self-acting, furnished with pneumatic fan. Carriage 6 feet long, 39 inches wide	225

Sandpaper especially prepared from quartz for use on these Machines is furnished in rolls at wholesale prices.

SAW BENCHES WITH WOODEN FRAMES.

No.	1.	Table	ft.	ft.	in.	12	diam.	..	£
"	2.	"	2½	"	4	receives	saws	to	9
"	2.	"	2½	"	4½	"	"	"	10
"	3.	"	3	"	5	"	"	"	11
"	4.	"	3½	"	5½	"	"	"	12
"	5.	"	3½	"	6	"	"	"	13
"	6.	"	3½	"	6	"	"	"	14

SLITTING SAW BENCHES.

Iron Saw Benches, with fast-and-loose pulleys, the tables and spindle bearings fixed.

No. 1.	Saw Bench	ft.	ft.	in diam.	£
" 2.	"	3½	by 2	receives saws to 16	.. 22
" 3.	"	4½	"	"	24 .. 28
" 4.	"	5½	"	"	36 .. 38
" 5.	"	6½	"	"	42 .. 45
" 6.	"	7½	"	"	48 .. 55

Machinery delivered in Liverpool or Antwerp. No extra charge for essential details.

RICHARDS, LONDON, AND KELLEY,
ENGINEERS, ATLANTIC WORKS, PHILADELPHIA, U.S.A.
AGENCY: 10, JOHN STREET, ADELPHI, LONDON.

IRON STAIRCASES,

CIRCULAR AND STRAIGHT, BOTH PLAIN AND ORNAMENTAL;
STAIRCASE AND ALTAR RAILINGS, &c.

FOR PATTERNS OF WHICH SEE SEPARATE LITHOGRAPHIC SHEETS AND PRICES ON APPLICATION.

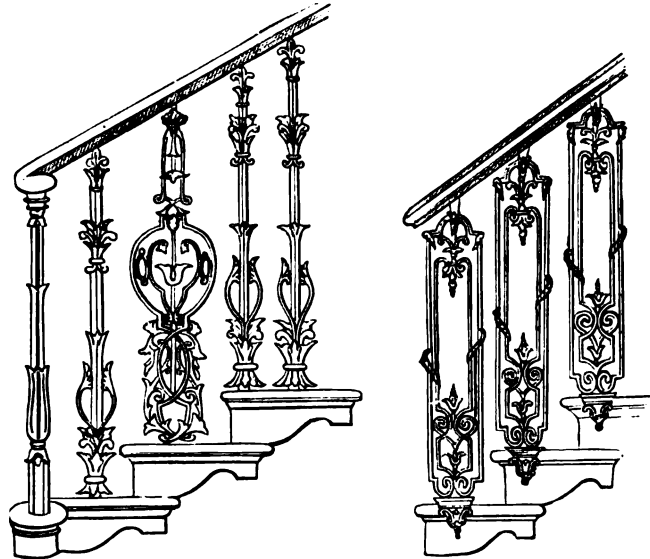
COTTAM'S CIRCULAR IRON STAIRCASES,

Plain and Ornamental, for Stables and other Buildings—for communication from floor to floor where space is an object.



ORNAMENTAL STAIRCASES, BARS, NEWELS, AND PANELS, IN GREAT VARIETY.

(Separate Lithographic Sheets on application.)



LIST OF PRICES.

ft.	in.		£	s.	d.
3	6	diameter, per foot high	1	1	0
4	0	"	1	2	6
4	6	"	1	5	0
5	0	"	1	6	0
5	6	"	1	12	0
6	0	"	2	0	0
Landings, &c., extra.					

* * The above Prices include fitting ready for putting together, and Painting one coat, but exclusive of lead, carriage, and fixing.

COTTAM AND COMPANY beg to draw particular attention to this, an important branch of their 'Trade, which they closely follow up, and keep experienced workmen solely engaged in it.

Their stock of Patterns and Drawings affords a better and greater selection than can be seen at any other Manufactory, and of which they invite the inspection of all requiring such work.

COTTAM AND COMPANY,

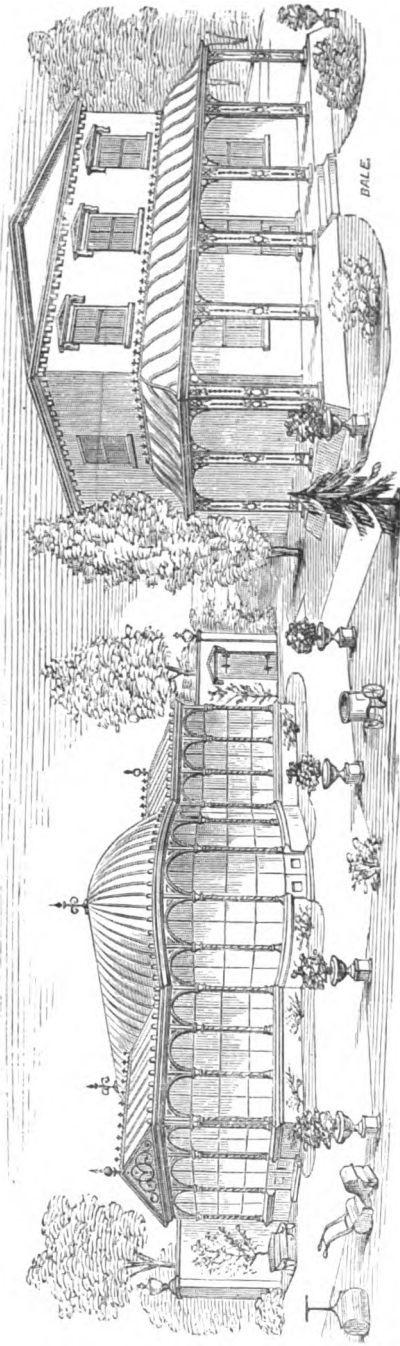
IRON WORKS,

2, WINSLEY STREET (OPPOSITE THE PANTHEON), OXFORD STREET, LONDON, W.

ESTABLISHED 1818.

v

CONSERVATORIES, HOT-WATER APPARATUS, AND VERANDAHS.



COTTAM'S Conservatories, Hot-houses, Verandahs, &c., made upon the most improved principle, either of Iron or of Iron and Wood combined, which can be fixed in any part of the kingdom at very reduced prices. The improvement in the Sash Bar with which these houses are made is so formed as to combine great strength with extreme lightness; the mitres being made by a newly-invented machine, have not only lessened the expense but ensured a perfect and neat mitre at the joint.

** Apply for separate Lithographic Sheets and Prices of the above.

HOT-WATER APPARATUS, FOR HEATING HOT-HOUSES, CONSERVATORIES, GREEN-HOUSES, &c.

COTTAM AND COMPANY having had thirty years' experience, and having warmed by the circulation of hot water upwards of 4000 buildings, can with confidence recommend their system, which, by the various improvements they have made, has perfected the construction and economized the expense. For the convenience of persons desirous of fixing the Apparatus themselves, a List of Prices of the various materials required in the construction will be supplied on application. They are all of the most improved patterns, and the prices at a low figure. Although every information will be given as to plans and mode of fixing, it must be distinctly understood that they cannot be answerable for the proper working of any Apparatus not fixed by themselves; their experience for upwards of thirty years will be a sufficient guarantee as to the proper working of any Apparatus fixed by them.

COTTAM AND Co. direct attention to their numerous designs for Verandahs and Porches, the supports being plain or ornamental, consisting of Columns or Flat Pilasters, which are adapted for climbing-shrubs, &c. These Verandahs can be made of any reasonable width, and are covered either with Zinc, Iron, or Glass, upon Wrought-Iron Ribs, as occasion may require; and as the several parts are all fitted together before they are forwarded to their destination they can be easily erected by the local carpenter; or, if required, COTTAM AND Co. send and erect them in any part of the country; they also undertake to supply the Stone Plinths or a continuous Curb for the supports to rest upon, and pave the space with plain or ornamental Tiles, which in many situations have a very pleasing effect. The Porches when wholly or partly glazed and fitted with a few shelves or flower-stands serve admirably for small conservatories, and form very pretty entrances to the dwelling house.

DRAWINGS AND ESTIMATES FREE ON APPLICATION.

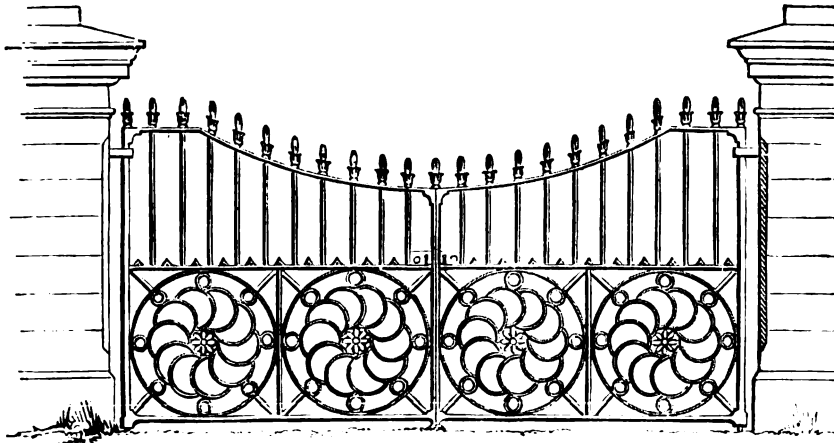
COTTAM AND COMPANY,

IRON WORKS,

2, WINSLEY STREET (OPPOSITE THE PANTHEON), OXFORD STREET, LONDON, W.

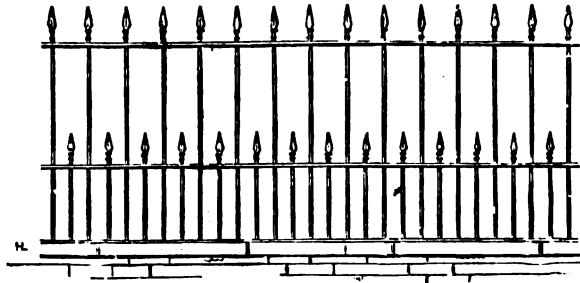
ESTABLISHED 1818.

CARRIAGE ENTRANCE GATES AND RAILINGS.



COTTAM AND COMPANY'S published Designs for Gates and Railings are very numerous, both in Wrought and Cast Iron, from the plainest and cheapest description to that of a more ornamental character.

* Apply for separate Lithographic Sheets and Prices.



BY HER MAJESTY'S ROYAL LETTERS PATENT.

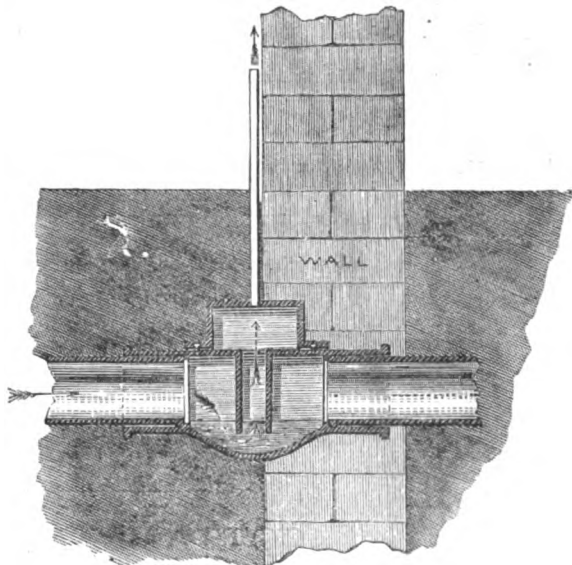
THE EFFLUVIUM INTERCEPTOR,

For Preventing Noxious Gases and Bad Smells entering Dwelling Houses, Hospitals, Stables, &c., from Drains, Sewers, Cesspools, &c. EDWARD COTTAM, A.I.C.E., PATENTEE.

This PATENT TRAP, recently invented, is of the simplest construction, and for the use of private houses, &c. It effectually prevents the entry of foul air from the drain into the house. The water joint of the Trap in general use is, from a variety of causes, constantly forced by the external foul air, which then enters the house, and to show how slight a pressure from without effects this, a Model is exhibited at COTTAM AND COMPANY'S, 2, Winsley Street, Oxford Street, W., where all particulars can be obtained.

The Woodcut represents a section of the Interceptor Trap, with the ordinary inlet and outlet drain-pipes attached. It is fixed close to the outer wall of the building: the arrows show the course of the foul air returning from the sewer, and the manner in which it is trapped, and caused to ascend a perpendicular pipe at the side of the house, from which it escapes at such a distance as to become perfectly innocuous. The Box on the top of the Trap is intended to be filled with Charcoal, for disinfecting the escaping gases. Price of the Trap in Cast Iron :

For 3 inch Stoneware Drain Pipe	£0 17 6
" 4 " "	1 10 0
" 6 " "	2 10 0
" 9 " "	4 10 0
" 12 " "	7 10 0



LONGITUDINAL SECTION

COTTAM AND COMPANY,

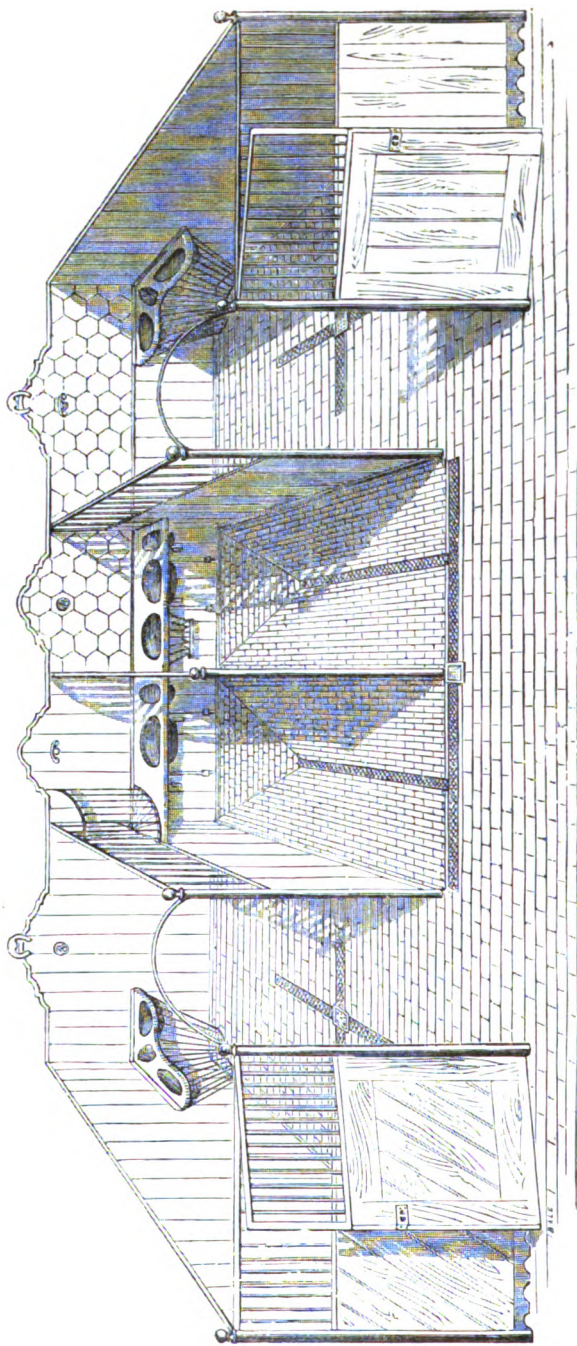
IRON-WORKS,

2, WINSLEY STREET (OPPOSITE THE PANTHEON), OXFORD STREET, LONDON, W

ESTABLISHED 1818.

STABLE AND HARNESS FITTINGS.

PATRONIZED BY THE ENGLISH AND CHIEF FOREIGN GOVERNMENTS, AS WELL AS BY THE PRINCIPAL NOBILITY, GENTRY, AND HUNTING ESTABLISHMENTS IN THE KINGDOM.



SECURITY FROM ACCIDENT by the use of the PATENT HALTER GUIDE and IMPROVED CURVED TOP PLATE; PROMOTION of HEALTH, COMFORT, and CONDITION, by the cleanliness and power of resisting infection of the Mangers and Troughs; and also of the PATENT DROP-COVER, to curtail the quantity of water to be imbibed; ECONOMY IN THE USE OF FOOD, from the improved formation of the fittings and by means of the Patent Seed Box, are some of the peculiar recommendations of COTTAM'S ENAMELLED and GALVANIZED IRON FITTINGS for STALLS and LOOSE BOXES.

These Fittings, now so generally specified by Architects in their Specifications, may be seen at the Manufactory, 2, WINSLEY STREET, OXFORD STREET, W., where a large public supply is always on hand, and regular sizes kept in stock, and where full-sized Stalls and Loose Boxes (variously arranged, with a view to economy of space) can be examined.

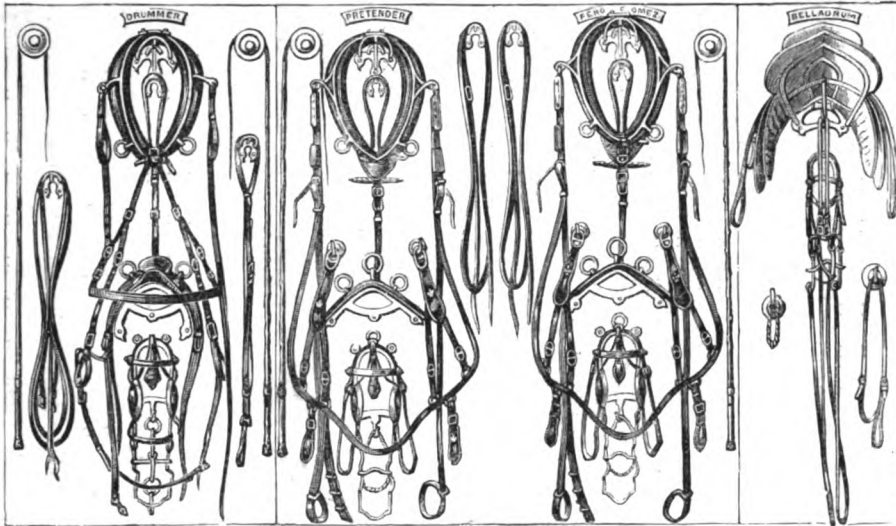
COTTAM AND COMPANY,

IRON WORKS,

2, WINSLEY STREET (OPPOSITE THE PANTHEON), OXFORD STREET, LONDON, W.

ESTABLISHED 1818.

COTTAM'S IMPROVED WROUGHT-IRON VENTILATING BRACKETS.



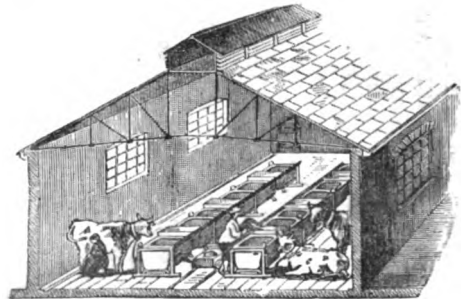
Durability, Neatness, Economy, and Suitability of Design, are combined in these Fittings, which are recommended as the most desirable articles for their purpose ever invented, being made as nearly as possible the shape of the Harness, &c., they are intended to support; thus the natural form of the Saddle or Harness is retained, and the Leather preserved from cracking (advantages too often overlooked). The openings between the bars allow a free admission of air to dry the under parts of the saddle, collar, or harness pads.

BY HER MAJESTY'S ROYAL LETTERS PATENT.

COTTAM'S PATENT PORTABLE UNITED COW-FITTINGS. NO FIXING REQUIRED.

The Cattle Plague necessitating the more general adoption of Stall Feeding, the arrangement and construction of the Apparatus for that purpose becomes a matter of the first importance.

COTTAM'S PATENT FEEDING TROUGHS have received the approval of those fully qualified to express an opinion on the subject, as being the simplest, yet most perfect and complete article for their purpose ever made.



COTTAM AND CO., Manufacturers and Patentees, hold the Prizes of all the Great Exhibitions for these Fittings.

* * APPLY FOR NO. 3 CATALOGUE.

IRON GATES, FENCING, AND HURDLES MADE BY MACHINERY.

COTTAM AND COMPANY,

IRON WORKS,

2, WINSLEY STREET (OPPOSITE THE PANTHEON), OXFORD STREET, LONDON, W.

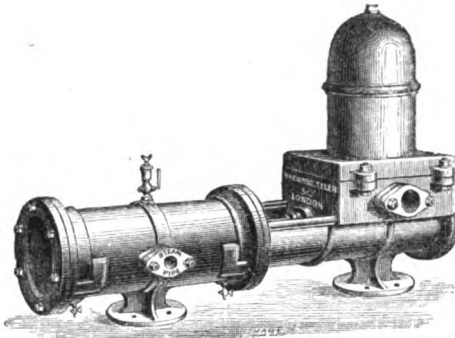
ESTABLISHED 1818.

SILVER MEDAL, 1872.

ROYAL CORNWALL
POLYTECHNIC.

MEDAL FOR PROGRESS,
1873.

VIENNA EXHIBITION.



GOLD MEDAL, 1874.

AGRICOLI DI LEBE.

SILVER MEDAL, 1874.

AGRICULTURAL SHOW,
MANCHESTER.

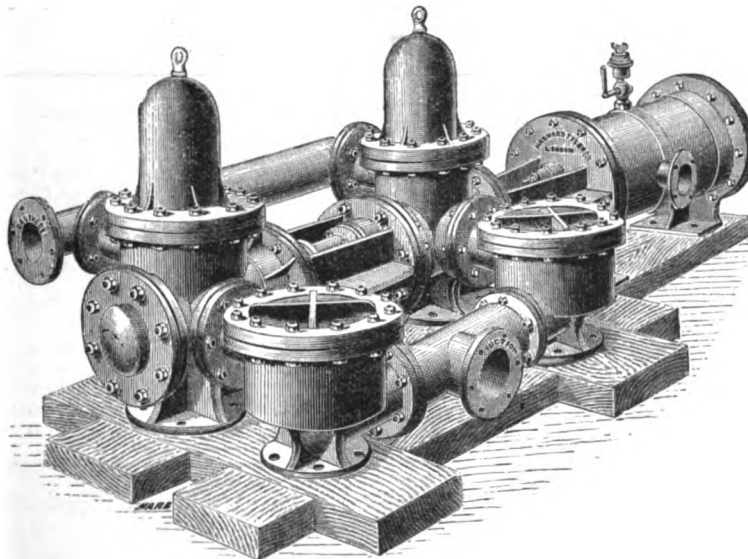
SOME OF THE SIZES OF "UNIVERSAL" STEAM-PUMPS.

Diameter of Steam Cylinders.	Diameter of Pump.	Diameter of Suction Pipe.	Diameter of Delivery Pipe.	Diameter of Steam Pipe.	Diameter of Exhaust Pipe.	Gallons per Hour.	Number of Strokes.	Total Length.	Total Width.	Weight. (Approximate.)	Price.
inches.	inches.	inches.	inches.	inches.	inches.	Approx.	Per Min.	inches.	inches.	cwt. qrs. lb.	£
4	2	1	1	$\frac{3}{4}$	1	750	100	36	10	1 2 20	20
4	3	2	$1\frac{1}{2}$	$\frac{3}{4}$	1	1,750	100	36	12	2 0 7	25
5	3	2	$1\frac{1}{2}$	$\frac{3}{4}$	1	2,000	85	44	12	2 2 24	30
5	5	3	2	$\frac{3}{4}$	1	5,500	85	48	15	4 2 18	40
6	3	2	$1\frac{1}{2}$	1	$1\frac{1}{2}$	2,000	85	44	12	3 2 0	35
6	4	$2\frac{1}{2}$	2	1	$1\frac{1}{2}$	3,500	85	46	13	4 0 0	40
6	5	3	$2\frac{1}{2}$	1	$1\frac{1}{2}$	5,500	85	48	15	5 0 0	45
7	4	$2\frac{1}{2}$	2	1	$1\frac{1}{2}$	3,500	85	46	13	4 0 12	45
7	5	3	$2\frac{1}{2}$	1	$1\frac{1}{2}$	5,500	85	48	15	4 3 24	50
7	6	4	3	1	$1\frac{1}{2}$	7,900	85	52	17	6 2 10	55
9	5	4	3	$1\frac{1}{2}$	2	5,500	70	58	17	8 3 4	60
9	6	4	3	$1\frac{1}{2}$	2	7,900	70	58	17	8 1 14	65
9	7	5	4	$1\frac{1}{2}$	2	10,800	70	66	12	11 3 0	75
										And Upwards.	

The "Universal" can be driven by Compressed Air.

HAYWARD TYLER AND CO.'S PATENT "UNIVERSAL" DIRECT-ACTING STEAM PUMP.

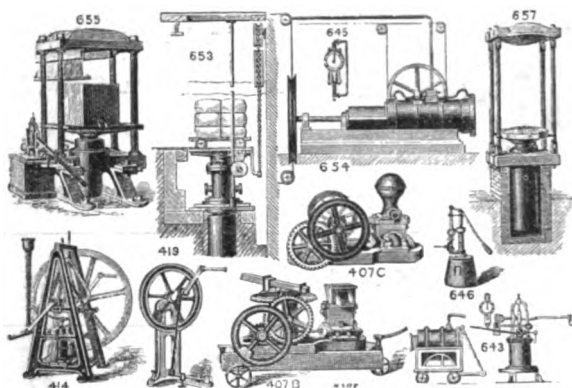
For use in deep Mines, Quarries, &c., for heavy Lifts.



Combinations of different Sizes up to 33-inch Steam Cylinders, 12-inch Pumps.

HAYWARD TYLER AND CO.,
ENGINEERS, 84, WHITECROSS STREET, LONDON.

WELL ENGINES AND HYDRAULIC MACHINERY.



414. HAYWARD TYLER AND CO.'S IMPROVED WELL ENGINE, as supplied by them to the Great Indian Peninsular Railway Company, &c.

With frame **A** shaped and "kite" motion, with double or treble brass pumps, wrought-iron crank, metal valves, doors to get at suction valves, 4 ft. 6 in. fly-wheel, brass couplings, and two handles, complete.

With double 3½-inch barrels	..	£34	0	0
" 4 "	..	36	0	0
With treble 3 "	..	42	10	0
" 3½ "	..	46	0	0

These Well Engines are so constructed that the pumps may be taken out of the frame and the whole adapted for a deep well with very little trouble.

407B. PATENT PORTABLE PUMP, FOR IRRIGATION AND OTHER PURPOSES. To be worked by horse or bullock power. HAYWARD TYLER AND Co., Sole Makers. Made with OPEN HEAD, as shown, or with AIR VESSEL and UNION for HOSE. (In ordering please state if both are required.)

The pole is so arranged as to be self-adjusting to the height of different bullocks, &c.

This Pump is made on the Patent California principle, by which all the valves are accessible by loosening two swing bolts, and can be examined and replaced without danger of mistake by any unskilled hand. The joints are formed of the same piece of leather or indiarubber as the valves, and therefore no trouble is incurred in re-making the joints 6 in., £38 10s.

407C. PATENT CALIFORNIA PUMPS ON HORIZONTAL FRAMES OR BED PLATES, FOR DRIVING BY STEAM POWER. These Machines are all provided with wrought-iron cranks, slings, &c., and gun-metal couplings and bearings throughout. They are found most useful pumps for factories, &c.

PARTICULARS AND PRICES.

PUMP.		DRIVING PULLEYS.		SUCTION. Screwed to Wrought-Iron Pipe.	DELIVERY. Screwed to Wrought-Iron Pipe.	QUANTITY per hour at 40 revolutions of Pump Crank per minute.	PRICES.		
							On strong Wood Frame.	On strong Cast-Iron Bed Plate.	On strong Cast-Iron Bed Plate and Gearing.
Diameter.	Stroke.	Diameter.	Face.	inches.	inches.	gallons.	£ s. d.	£ s. d.	£ s. d.
2½	4	12	3	1½	1½	330	10 0 0		
3	5	12	3	1½	1½	580	12 0 0		
3½	6	12	3	2	2	1000	14 0 0		
4	5	12	3	2	2	1050	14 0 0		
4½	9	16	3	2½	2	2300		26 0 0	29 0 0
5	5	15	3	2½	2½	1600		19 0 0	22 0 0
5	6	15	3	3	2½	2800		26 0 0	
6	8	16	4	3	2½	3700		28 0 0	31 0 0
7	8	16	4	4	3	5100		34 0 0	39 0 0

Prices of Hydraulic Presses, Hoists, and Testing Machines on application.

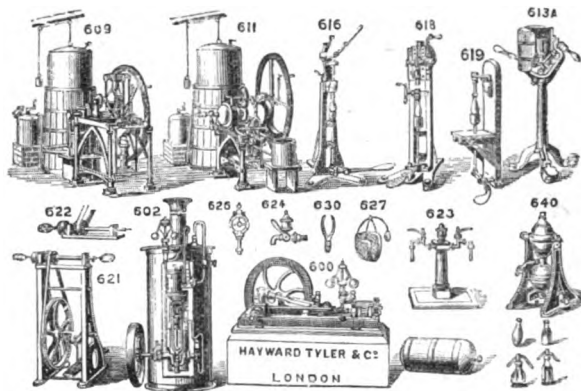
HAYWARD TYLER AND CO.,
ENGINEERS, 84, WHITECROSS STREET, LONDON.

AËRATED WATER MACHINERY.

HAYWARD TYLER AND Co. are the oldest Makers in England of Aërated Water Machinery.

**PATENT CONTINUOUS
PRINCIPLE BEAM-ACTION
MACHINES.**

No. 1.	To make 300 doz. per day	.. £82 10
" 2.	" 200 "	.. 77 0
" 3.	" 150 "	.. 71 10



**BRAMAH'S ORIGINAL CONTINUOUS PROCESS SODA-WATER
MACHINES.**

No. 1.	To make 300 dozen per day	.. .. .	£71 10 0
" 2.	" 200 "	.. .. .	66 0 0
" 3.	" 150 "	.. .. .	60 10 0
" 4.	" 80 "	.. .. .	49 10 0
" 5.	" 40 "	.. .. .	28 0 0

MACHINES FOR LARGE FACTORIES.

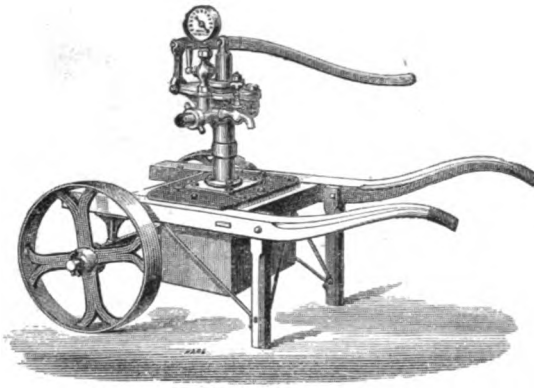
2-inch double Pumps in frame	.. .. .	52 0 0
2½-inch " "	.. .. .	62 0 0
14-gallon Copper Cylinder in frame, with pressure and water gauge	.. .. .	26 0 0
28-gallon Copper Cylinder in frame, with pressure and water gauge	.. .. .	36 0 0
Bottling Machine	.. .. .	10 0 0
Syphon Bottling Machine	.. .. .	8 10 0
Washing Trough, with double brushing head	.. .. .	12 0 0
Steam Pans for Syrups	 £9 10s. to	27 10 0
Enamel Cooling Pans	 £2 7s. 6d. to	4 5 0
High-Pressure Filter	.. .. .	3 15 0



HAYWARD TYLER AND CO.,
ENGINEERS, 84, WHITECROSS STREET, LONDON.

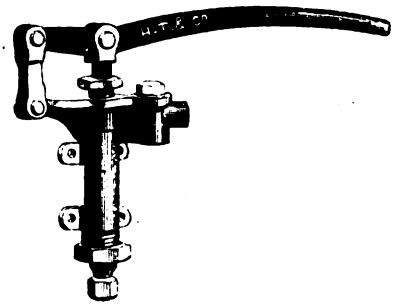
Z

HYDRAULIC PROVING PUMP.



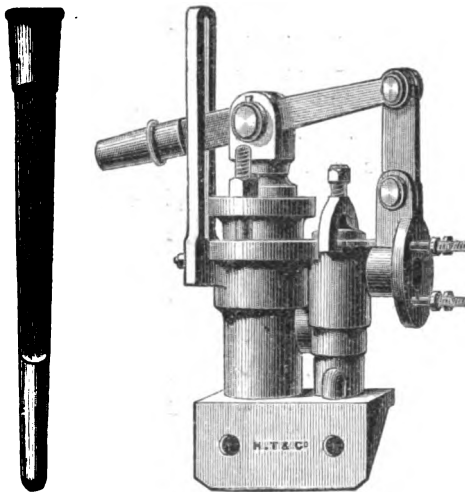
MOUNTED ON BARROW.

Price complete for proving to 300 lb. per square inch, with pressure gauge and union for hose,
£10 10s.

848c. GUN-METAL PUMP, FOR
BOILER FEEDING, &c.

Without plank, 1 inch,	1½-inch plunger,
50s.	80s. each.
With plank, 1 inch,	1½-inch plunger,
58s.	88s. each.

"HANDY" BOILER FEEDER.



848b. HAND BOILER FEEDER.

This arrangement of Boiler Feeder will be found very handy, and easy of application to all Boilers, and in many cases, such as in a breakdown of the regular feed-pump, it will be found invaluable.

No. 1, with 1½-inch plunger, 2½-inch stroke,
£3 15s. each.

This pump is calculated to deliver, at 36 strokes per minute, about ½ of a cubic foot of water a minute, or 7 cubic feet an hour.

No. 2, with 2½-inch plunger, 4-inch stroke,
£5 10s. each.

At 36 strokes, about ¾ of a cubic foot a minute, or 20 cubic feet an hour.

HAYWARD TYLER AND CO.,
ENGINEERS, 84, WHITECROSS STREET, LONDON.

COMBINED VERTICAL ENGINE AND BOILER, ADAPTED FOR DEEP WELLS.

602a. HIGH-PRESSURE STEAM ENGINE, complete, on Vertical Self-contained Boiler, requiring no foundation or setting, nor chimney shaft—the chimney being supplied with the Boiler, or, if more convenient, a pipe to lead into any ordinary chimney to carry off the smoke. These are the best adapted for small factories, as the Boiler and Engine together take up so little room. The Engine being entirely constructed on its own bed plate, separate from, but firmly secured to, the Boiler, there is no chance of the Boiler being strained by the working of the Engine, or the Engine becoming unduly heated by proximity to the Boiler.

PRICES.

Two horse-power Engine, Cylinder $4\frac{1}{2}$ inches diameter, stroke 8 inches, complete with governors, fly wheel, safety valve, pressure and water gauges, and stoking tools, £70 each.

Three horse-power Engine, cylinder $5\frac{1}{4}$ inches diameter, stroke 8 inches, £80 each.

427a. STRONG HORIZONTAL CAST-IRON FRAME AND GEARING, for Well Pumps, to be driven from a Steam Engine or other power, with extra strong double-throw wrought-iron crank, slings and guides, £25; ditto, with three-throw crank, &c., £30.

464. EXTRA STRONG, FULL-WAY TREBLE BARREL PUMPS, with doors to valves. 10-inch stroke.

$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$
£17 17s.	£19 19s.	£23 10s.	£31 10s.	£38 10s.
	5	6 inch.		
	£47 10s.	£65 each.		

With extra strong brass buckets and hard drawn copper rods.

These Pumps are recommended for the great facility which the movable doors afford for cleaning or repairing the clacks and valves without removing the Pumps from the well. The waterways of the valves being full size, render the working of the Pumps much easier than with the ordinary construction.

479. COPPER AIR-VESSLS FOR DEEP WELL PUMPS, &c. These should be fixed in all cases where a great length of rising main is required, as a continuous flow of water is ensured and concussion in the pipe prevented.

For $2\frac{1}{2}$ and 3 inch Pump £1 5 6 each.

For $3\frac{1}{2}$ and 4 inch „ £1 10 0 „

472. IRON WELL ROD, with brass couplings and joints every 12 feet.

$\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	1 inch.
8d.	9d.	1/2	1/4 each.

476. CAST-IRON STAGES FOR WELLS, including roller guides and supports for pipe.

4 feet 6 inch Stage Single Pump £1 7 6 each.

„ „ Double „ £1 12 6 „

„ „ Treble „ £1 19 0 „

477. CAST-IRON STAGES FOR WELLS, for supporting Pump barrels.

4 feet 6 inch Bearers for Single Pump £1 8 6 each.

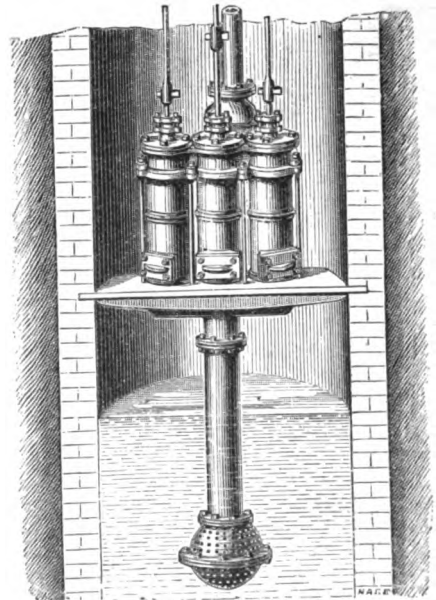
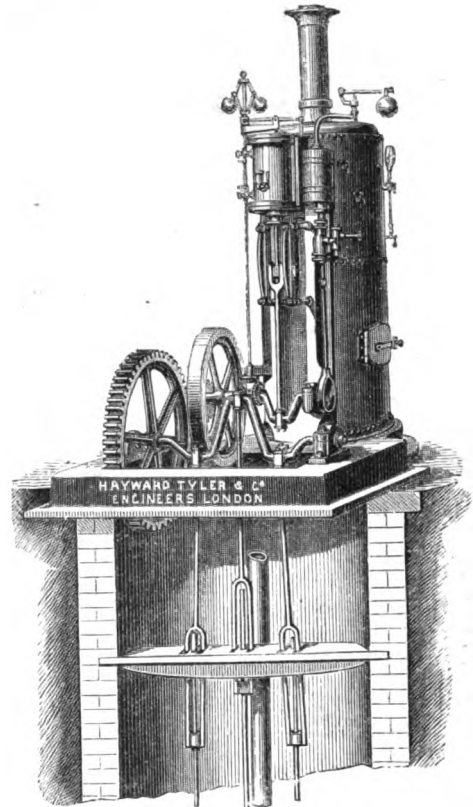
„ „ Double „ £1 10 6 „

„ „ Treble „ £1 14 9 „

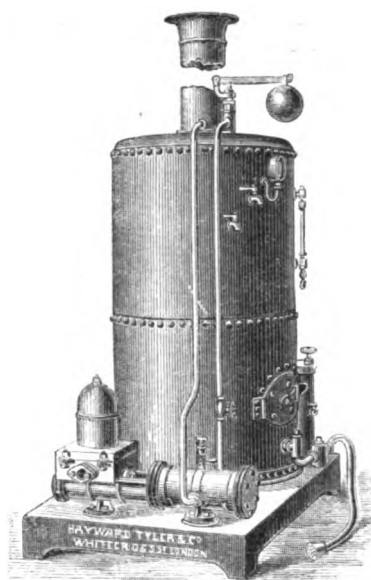
48ca. CAST-IRON FOOT VALVES, screwed to fit wrought-iron gas pipes, or with flanges for cast-iron flange pipes.

1	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{2}$	3	4
6/3	7/6	10/0	12/6	15/0	18/6	24/0	34/0
							each.

516. COPPER SUCTION ROSES,
For $1\frac{1}{2}$ $1\frac{3}{4}$ 2 $2\frac{1}{2}$ 3 inch hose.
4/9 5/6 6/6 8/3 9/9 each.



HAYWARD TYLER AND CO.,
ENGINEERS, 84, WHITECROSS STREET, LONDON.



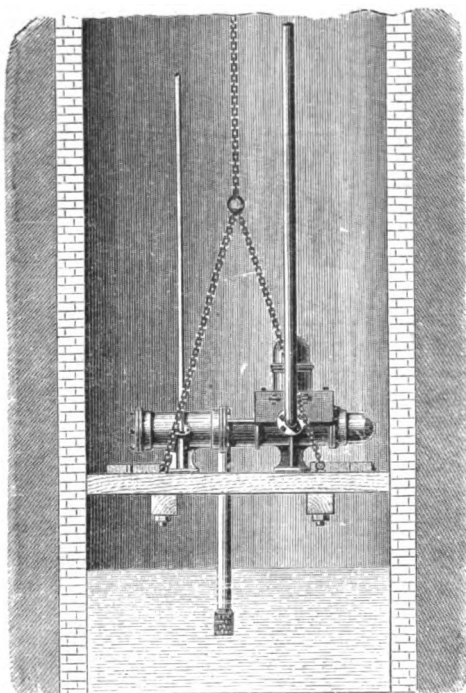
"Universal" on Boiler.

PATENT "UNIVERSAL" DIRECT-ACTING STEAM PUMP.

PRICES OF PATENT "UNIVERSAL" STEAM PUMPS.

With Vertical Cross Tube Boiler and Mountings,
on Cast-Iron Bed Plate.

Vertical Steam Boiler.	Diam. of Steam cylinder	Diam. of Pump.	Gallons per Hour.	Number of Strokes.	Price without Feeder.	Price with Vertl. Feeder attached.	Price with Injector attached.
H.-2.							
2	4	2	700	100	60	66	66
2	4	3	1,500	100	65	71	71
2	4	4	2,500	80	70	76	76
3	5	4	3,000	80	84	90	90
3	5	5	5,000	80	89	103	95
3½	6	5	5,000	80	100	115	106
3½	6	6	7,000	80	105	120	111
4	7	5	5,000	80	112	126	118
4	7	6	7,000	80	117	131	123
4	7	7	8,900	70	120	134	126
5	9	7	10,000	65	147	161	153
7	12	8	12,500	50	203	220	210
7	12	10	19,600	50	220	234	227
8	12	12	30,000	55	250	264	257



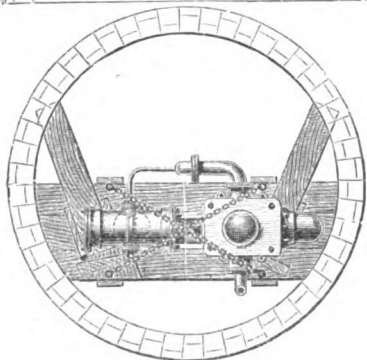
SIZES AND PRICES OF DOUBLE-ACTING PLUNGER PUMPS.

From 5-inch Cylinder and 3-inch Pumps to 9-inch Cylinders
and 10-inch Pumps.

Diam. of Steam Cylinder	Diam. of Pump Plunger	Gallons per Hour.	Number of Strokes.	Total Length	Total Width.	Weight (Approximate).	Price.
inches.	inches.	Approx.	Per Min.	inches	inches.	cwt. qrs. lb.	£
5	3	1,600	80	55½	13		35
5	4	3,000	80	62	15	4 3 0	40
6	4	3,000	80	62	15	5 0 0	45
6	5	5,000	80	62	15	5 2 0	50
7	4	3,000	80	62	15	5 3 0	50
7	5	5,000	80	62	15	6 0 0	55
7	6	7,000	80	67	17	7 2 0	58
9	4	3,400	65	62	15	8 0 0	60
9	5	5,000	65	71	15	8 2 0	65
9	6	7,500	65	73	17	9 2 0	75
9	7	8,800	65	83	26½	12 0 0	80
9	7½	10,400	65	83	26½	12 2 0	85
9	9	17,000	65	96	37	26 0 0	100
9	10	21,000	65	96	37	26 2 0	110

And Upwards.

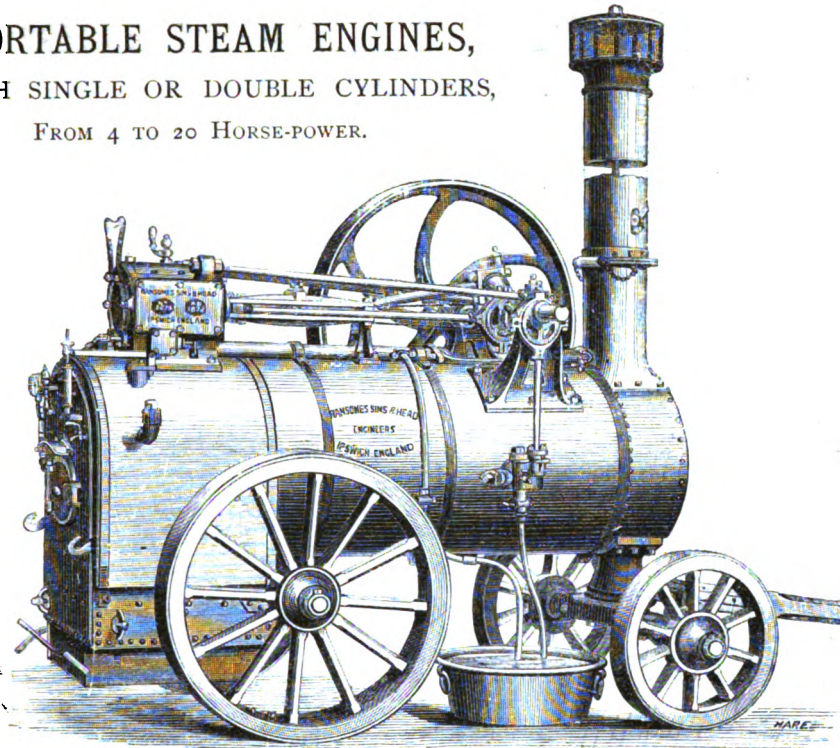
Specially adapted for Emptying Pits, &c.



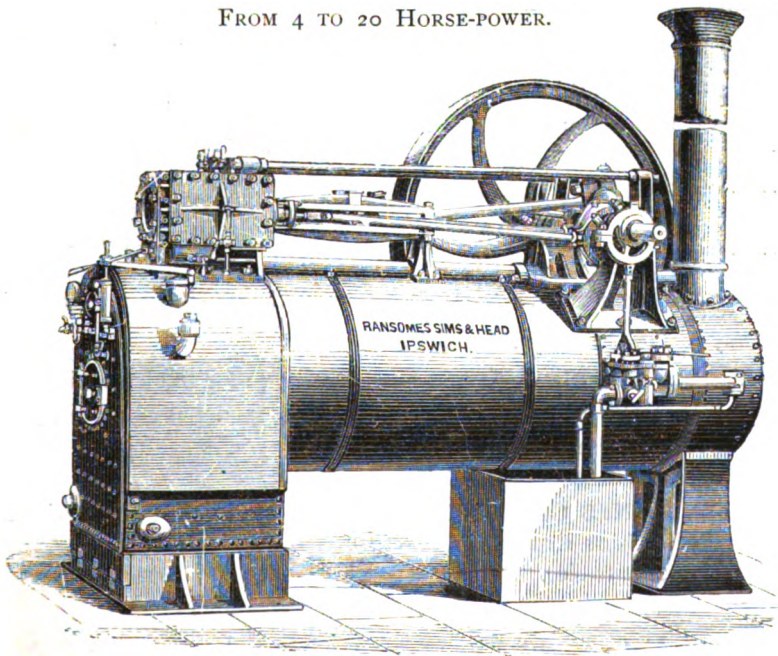
HAYWARD TYLER AND CO.,
ENGINEERS,

84, WHITECROSS STREET, LONDON.

**PORTABLE STEAM ENGINES,
WITH SINGLE OR DOUBLE CYLINDERS,
FROM 4 TO 20 HORSE-POWER.**



**FIXED ENGINES,
ON MULTITUBULAR BOILERS, WITH SINGLE OR DOUBLE CYLINDERS,
FROM 4 TO 20 HORSE-POWER.**



**RANSOMES, SIMS, AND HEAD,
ORWELL WORKS, IPSWICH.**

PORTABLE ENGINES.

These Engines are all of the very first quality. Every Engine is tried under steam before it leaves the Works.

The Prices include a Steam-Pressure Gauge, two Safety Valves, Arrangement for Heating Feed Water, Signal Whistle, Waterproof Cover, Tube Brush, Fire Pricker, Rake, Shovel, Screw Spanners, Oil Can, Large Funnel, and spare Gauge-Glass.

ORDINARY PORTABLE ENGINES.—Working pressure 70 lb. per square inch, at which they give off double their nominal horse-power.

Consumption of good Coal, $5\frac{1}{2}$ to 6 lb. per horse-power per hour.

PRICES.

Horse-power.	With all usual Accessories.	With large Fire Box for burning Wood.	Set of additional Wearing Parts.	Average Nett Weight.	Cost of Packing.
	£ s. d.	£ s. d.	£ s. d.	tons cwt. qrs.	£ s. d.
4 Horse-power, 1 Cylinder..	180 0 0	184 0 0	13 5 0	2 3 0	4 0 0
6 „ „ 1 „ ..	220 0 0	226 0 0	15 10 0	3 6 0	6 0 0
8 „ „ 1 „ ..	255 0 0	263 0 0	18 10 0	3 13 0	8 0 0
10 „ „ 1 „ ..	295 0 0	305 0 0	21 0 0	4 10 0	10 0 0
10 „ „ 2 „ ..	320 0 0	330 0 0	24 15 0	4 13 0	10 0 0
12 „ „ 1 „ ..	335 0 0	347 0 0	23 0 0	4 18 0	12 0 0
12 „ „ 2 „ ..	370 0 0	382 0 0	27 10 0	5 0 0	12 0 0
14 „ „ 2 „ ..	415 0 0	429 0 0	33 0 0	5 8 0	14 0 0
16 „ „ 2 „ ..	455 0 0	471 0 0	34 15 0	6 0 0	16 0 0
20 „ „ 2 „ ..	545 0 0	565 0 0	39 0 0	8 3 0	20 0 0

EXPANSION PORTABLE ENGINES.—Working pressure 80 lb. per square inch, at which they give off *three* times their nominal horse-power.

Consumption of good Coal $3\frac{1}{2}$ to $3\frac{3}{4}$ lb. per horse-power per hour.

PRICES.

	6-Horse, 1 Cylinder.	8-Horse, 1 Cylinder.	10-Horse, 1 Cylinder.	8-Horse, 2 Cylinders.	12-Horse, 2 Cylinders.	14-Horse, 2 Cylinders.	16-Horse, 2 Cylinders.	20-Horse, 2 Cylinders.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Including same Accessories as for ordinary Portable Engine ..	260 0 0	295 0 0	340 0 0	395 0 0	455 0 0	520 0 0	580 0 0	695 0 0
Set of extra Wearing Parts	23 15 0	26 10 0	27 10 0	36 10 0	38 10 0	42 0 0	46 0 0	53 0 0
Packing for Shipment ..	6 0 0	8 0 0	10 0 0	10 0 0	12 0 0	14 0 0	16 0 0	20 0 0
Average Weight unpacked	76 cwt.	90 cwt.	112 cwt.	115 cwt.	128 cwt.	131 cwt.	150 cwt.	186 cwt.

These Engines are so constructed as to burn Wood equally as well as Coals.

Additions to any of the Ordinary Portable or Expansion Portable Engines :

Link-Motion Reversing Gear, £15 for Single and £30 for Double Cylinder Engines.

Powerful Screw Brake to one hind road-wheel for mountainous countries, £10.

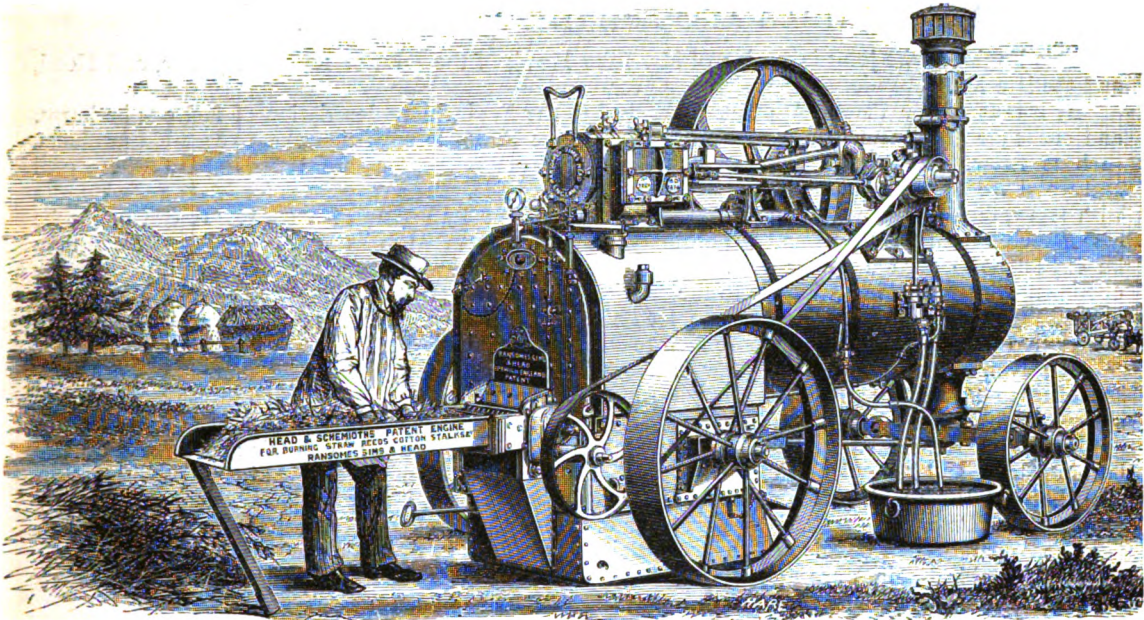
Awning to protect driver in tropical climates, £10.

STATIONARY ENGINES ON MULTITUBULAR BOILERS.—Any of the above Engines can be supplied on Pedestals as shown, instead of Travelling Wheels, at from £5 to £15 reduction from prices above, according to size.

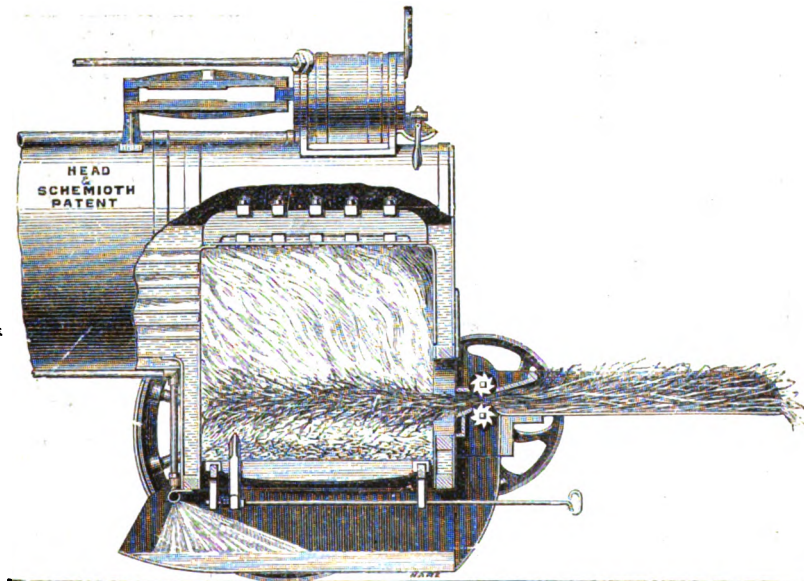
RANSOMES, SIMS, AND HEAD,
ORWELL WORKS, IPSWICH.

PATENT STRAW-BURNING ENGINE.

Perspective view, showing position of Feeder when the Engine is at work.



Section of Fire Box, showing method of holding Straw and other vegetable products in suspension in the Fire Box during process of combustion.



RANSOMES, SIMS, AND HEAD,
ORWELL WORKS, IPSWICH.

IMPROVED PATENT PORTABLE STEAM ENGINE.

ADAPTED FOR BURNING STRAW, COTTON AND MAIZE STALKS, REEDS, TIBEN, &C., AS WELL AS COAL OR WOOD.

HEAD AND SCHEMIOTH'S PATENT.

This Engine is the joint invention of Mr. John Head, of the Firm of Ransomes, Sims, and Head, and the late Mr. SchemiOTH, a Russian engineer.

By means of the Patent Apparatus attached to the Engine, any description of fuel can be burnt, and consequently Steam can now be used as a Motive Power in countries where vegetable products, such as straw, reeds, cotton and maize stalks, sugar-cane refuse, &c., are abundant, but where coal and wood are not easily obtained except at a very high price. The Apparatus for feeding the Engine with straw, &c., is self acting, and driven from the Engine by means of a strap. It can easily be disconnected from the Boiler and the ordinary fire-door substituted in its place, in cases where it may be expedient to burn wood or coal. Steam may be got up with straw as easily as with any other combustible, by attaching a handle to the feeding rollers, and turning them by hand instead of steam power. One man only is necessary to feed the straw into the machine; and an Engine of this description does not require any more men to superintend it than if coal or wood were used as fuel.

The average consumption of straw is about four to five times the weight of that of coal, and, according to experiments made, about eight to ten sheaves of straw are required to thrash one hundred sheaves of wheat.

A number of these Patent Engines have been at work for some time in Russia and other countries burning straw, and have given the utmost satisfaction; they have also been used in Egypt with cotton stalks, and in India with indigo refuse as fuel, and in both cases with the most successful results. By means of this Patent Apparatus small branches of trees, twigs, and furze can also be employed as fuel.

The Apparatus can be adapted to Fixed Boilers as well as to Portable Engines.

The Portable Engines are at present manufactured of 8 to 20 horse-power, both of the Ordinary and Expansion classes.

PRICES.

ORDINARY ENGINES.

	With usual Accessories.			Set of additional Wearing Parts.			Average Nett Weight.	Cost of Packing.		
	£	s.	d.	£	s.	d.		£	s.	d.
8 Horse-power, 1 Cylinder..	325	0	0	18	10	0	4 15 0	10	10	0
10 " 1 " "	370	0	0	21	0	0	5 12 0	12	10	0
10 " 2 " "	395	0	0	24	15	0	5 16 0	12	10	0
12 " 1 " "	415	0	0	23	0	0	6 10 0	14	10	0
12 " 2 " "	450	0	0	27	10	0	6 15 0	14	10	0
14 " 2 " "	505	0	0	33	0	0	7 3 0	16	10	0
16 " 2 " "	550	0	0	34	15	0	8 0 0	18	10	0
20 " 2 " "	645	0	0	39	0	0	9 8 0	22	10	0

EXPANSION ENGINES.

8 Horse-power, 1 Cylinder..	345	0	0	26	10	0	5 12 0	10	10	0
10 " 1 " "	395	0	0	27	10	0	6 17 0	12	10	0
10 " 2 " "	450	0	0	36	10	0	7 0 0	12	10	0
12 " 2 " "	510	0	0	38	10	0	7 15 0	14	10	0
14 " 2 " "	590	0	0	42	0	0	8 7 0	16	10	0
16 " 2 " "	655	0	0	46	0	0	9 5 0	18	10	0
20 " 2 " "	775	0	0	53	0	0	10 15 0	22	10	0

These Prices include a Steam-Pressure Gauge, Two Safety Valves, Signal Whistle, Waterproof Cover, Tube Brush, Fire Pricker, Rake, Shovel, Screw Spanner, Oil Can, Large Funnel, and spare Gauge-Glass.

The following additional extras are also required for these Engines for being used with any description of Fuel, viz. Extra Furnace Bars for Wood, 2 Bearer Bars, 1 Pricker for Fire, 1 Scraper for Tube Plate, 4 Rakes for cleaning Bars, 1 Steel Tube Cleaner, 1 Hoe for clearing Ash Pen, 1 Door for use when burning wood, and Cast Pan for hot ashes.

RANSOMES, SIMS, AND HEAD,
ORWELL WORKS, IPSWICH.

STEAM THRASHING MACHINERY.

RANSOMES, SIMS, AND HEAD construct their Thrashing Machines to fulfil the following conditions :

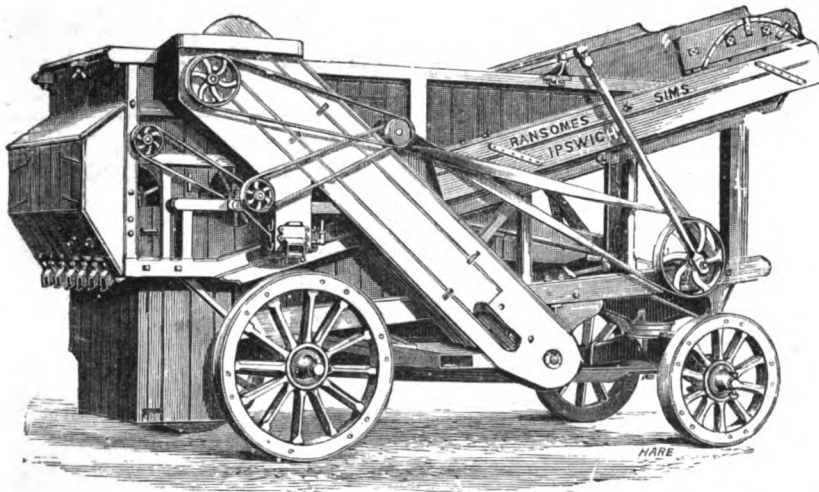
- 1st. DELIVERY OF A LARGE QUANTITY OF PERFECTLY CLEAN CORN IN A SHORT SPACE OF TIME.
- 2nd. STRENGTH OF CONSTRUCTION ; SIMPLICITY OF DESIGN ; AND FACILITY FOR REPAIRS.
- 3rd. ECONOMY OF FUEL ; AND SMALL AMOUNT OF POWER NECESSARY TO DRIVE THEM.

As the method of thrashing all descriptions of grain, and delivering the straw, differs in most countries, according to the nature of the crops and the practical utility of the straw, R., S., and H. have divided their Thrashing Machines into five classes, namely :

1. CLASS A—Double-Blast Machines, with Patent Rotary Screen, and all arrangements for making the most perfect and uniform sample of grain.
2. CLASS B—Double Blast, but without Rotary Screen. They clean the grain perfectly, but only separate the small and broken kernels from the bulk. They are well adapted for all districts where the grain is sold in bulk for exportation, irrespective of size and uniformity of sample.
3. CLASS C—Single-Blast Machines. They deliver the corn clean enough for some markets ; but for other places it requires to be passed through a finishing Dressing Machine. They are extremely simple in their construction and rapid in their operation.
- 4 and 5. CLASSES H and M—These Machines are similar to those of Classes B and C, but are fitted with an apparatus for chopping and bruising the straw as it leaves the Machine. They are specially adapted for hot countries, where hay is not grown, and straw is used for fodder.

DOUBLE-BLAST THRASHING MACHINE,

FITTED WITH SCREEN FOR FINISHING THE GRAIN.

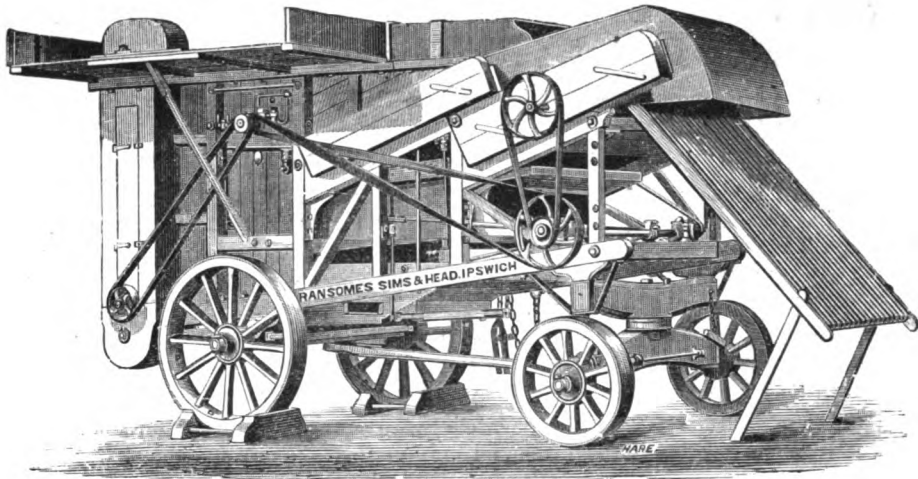


FINISHING MACHINES, CLASS A.

MARK.	Width of Drum.	Price, including Waterproof Cover and all usual Accessories.			Complete Set of additional Wearing Parts.			Cost of Packing.		Average Nett Weight.	Sets of Machines, including suitable Engine, Thrashing Machine, and Driving Band.						
											Engine adapted for burning Wood.			Engine adapted for burning Coal.			
A3	in.	£	s.	d.	£	s.	d.	£	s.	d.	cwt.	£	s.	d.	£	s.	d.
A1	60	170	0	0	17	0	0	13	10	0	72½	475	0	0	465	0	0
A9	54	160	0	0	15	10	0	12	10	0	69½	423	0	0	415	0	0
	48	140	0	0	14	10	0	10	0	0	60	366	0	0	360	0	0

RANSOMES, SIMS, AND HEAD,
ORWELL WORKS, IPSWICH.

POWERFUL THRASHING MACHINES FOR RAPID THRASHING.

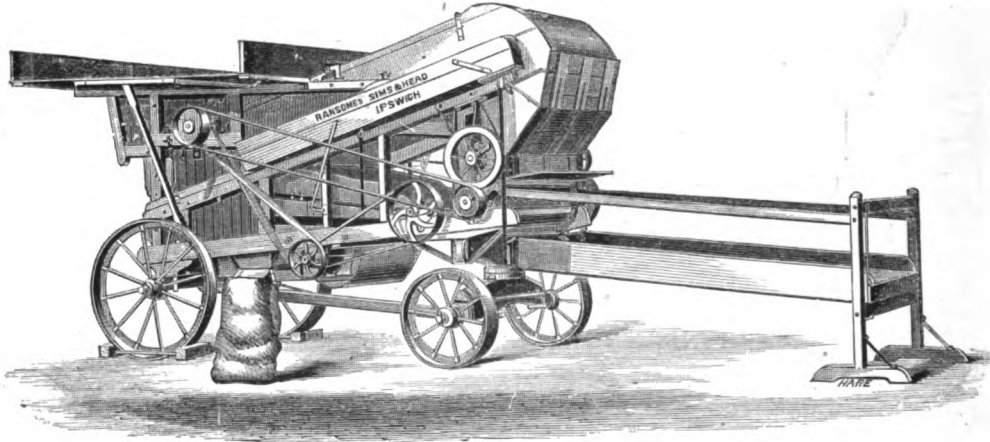


DOUBLE-BLAST MACHINES, CLASS B.

MARK.	Width of Drum.	Price, including Waterproof Cover and all usual Accessories.			Complete Set of additional Wearing Parts.			Cost of Packing.			Nett Weight.	Sets of Machines, including suitable Engine, Thrashing Machine, and Driving Band.					
												Engine adapted for burning Wood.			Engine adapted for burning Coal.		
B3) With {	in.	£	s.	d.	£	s.	d.	£	s.	d.	cwt.	£	s.	d.	£	s.	d.
B1) Double {	60	190	0	0	19	0	0	16	0	0	84	537	0	0	525	0	0
B1) Shakers.	54	180	0	0	18	0	0	13	10	0	80	485	0	0	475	0	0
B3) With {	60	170	0	0	16	10	0	15	0	0	67	475	0	0	465	0	0
B1) Single {	54	160	0	0	15	0	0	12	10	0	62½	423	0	0	415	0	0
B2) Shakers.	42	140	0	0	12	0	0	9	0	0	40	366	0	0	360	0	0

THRASHING MACHINES,

With Straw Chopping and Bruising Apparatus, for hot Countries.



CLASS M.

MARK.	Width of Drum.	Price, including Waterproof Cover and all usual Accessories.			Complete Set of additional Wearing Parts.			Cost of Packing.			Nett Weight.	Sets of Machines, including suitable Engines, Thrashing Machines, and Driving Band.					
												Engine adapted for burning Wood.			Engine adapted for burning Coal.		
M3	in.	£	s.	d.	£	s.	d.	£	s.	d.	cwt.	£	s.	d.	£	s.	d.
M1	60	240	0	0	38	10	0	14	10	0	81	587	0	0	520	0	0
	54	215	0	0	34	15	0	13	10	0	76						

RANSOMES, SIMS, AND HEAD,
ORWELL WORKS, IPSWICH.

STEAM THRASHING MACHINE,

CLASS B, READY FOR WORK.



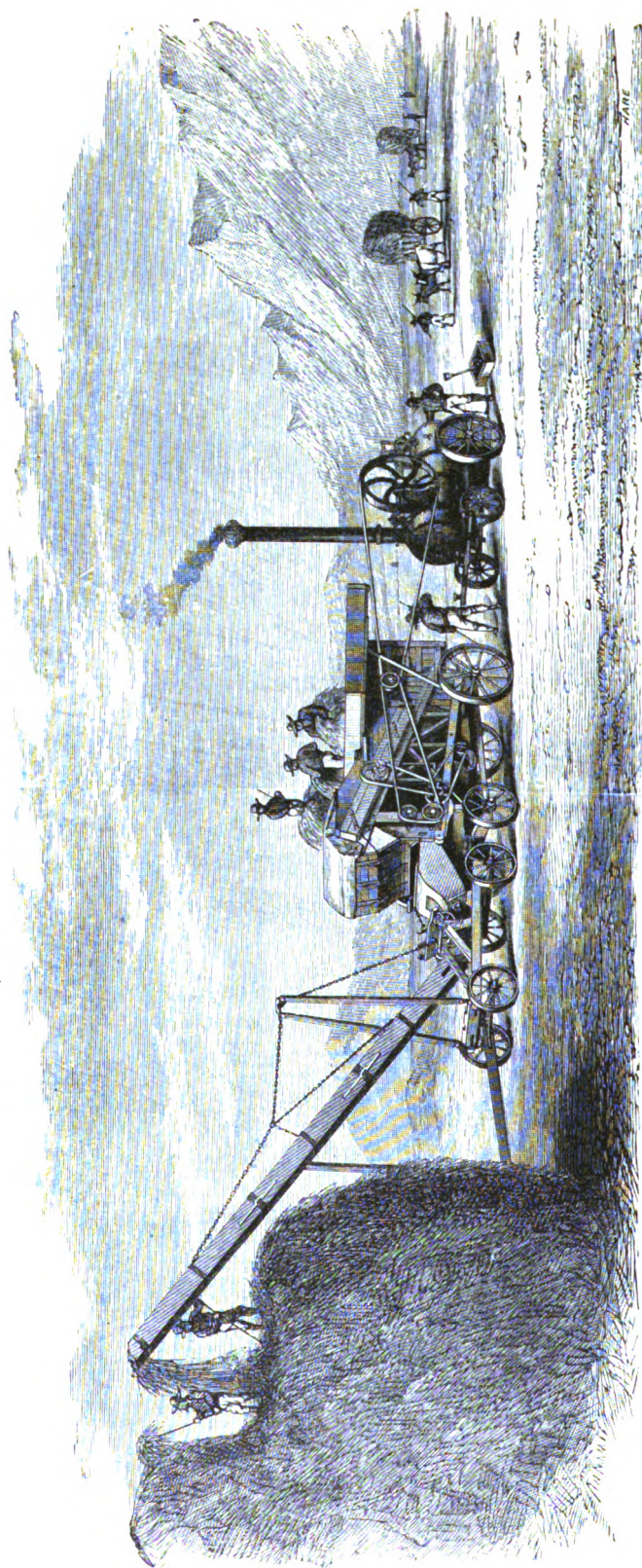
RANSOMES, SIMS, AND HEAD,
ORWELL WORKS, IPSWICH.

These Machines are specially adapted for the large corn-growing districts of the east of Europe, where it is necessary to thrash a large quantity of grain in a very short time. All the wearing parts are made doubly strong, so that the chances of breakage are reduced to a minimum, a matter of great importance in all countries where skilled labour is scarce and the nearest repairing shop a day's journey from the farm.

STEAM THRASHING MACHINE,

CLASS H OR M, AT WORK.

FITTED WITH APPARATUS FOR CHOPPING AND BRUISING THE STRAW, AND ELEVATOR FOR BLOWING THE CHOPPED STRAW ON TO THE STACK.

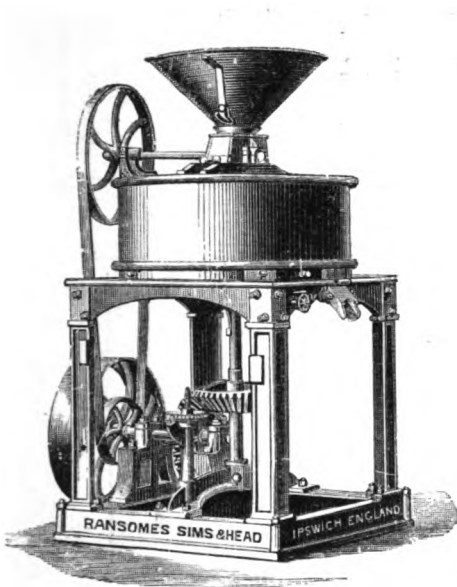


These Machines are specially suitable for all hot countries, where the grain has hitherto been trodden out by the feet of either horses or mules.

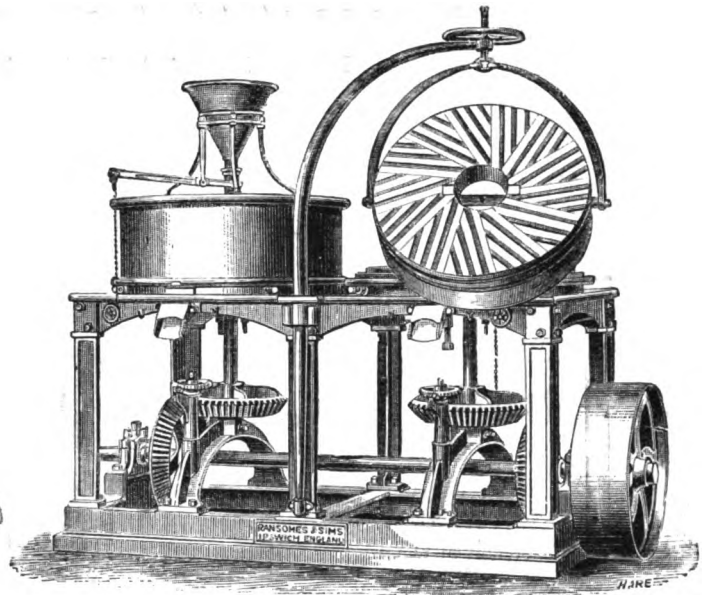
When the Machine is at work, the wheat, barley, or oats to be thrashed are fed in at the top of the Machine in the ordinary manner, and the grain comes out at one end of the Machine, perfectly clean and ready for market; whilst the straw passes out of the other end into the Straw Chopper, which reduces it into small pieces, perfectly separated and softened, in the same way as when trodden out by cattle; in addition to which, the straw thus chopped up is entirely free from dirt, dust, or dung.

The results obtained by these Machines in practice have shown that they are much more economical than the old system of treading out the grain. The farmer is enabled to thrash a large quantity of grain in a short space of time, and without the immense loss which has always attended the method hitherto employed; in addition to which he obtains a better price for his grain, owing to its being perfectly clean, and of a uniform sample; and the cattle also thrive better on the straw chopped by the Machine, on account of its freedom from dirt.

MILLS FOR GRINDING WHEAT, BARLEY, RYE, MAIZE, RICE, ETC.



MILL FOR GRINDING MAIZE.



CORN MILL, WITH TWO PAIRS OF STONES.

PRICES AND PARTICULARS OF PORTABLE CORN-MILLS ON IRON FRAMES.

Diameter of Stones	SINGLE MILLS.				DOUBLE MILLS.			
	30 inches.	36 inches.	42 inches.	48 inches.	36 inches.	42 inches.	48 inches.	
French Burr Stones	£ 55 0 0	£ 68 0 0	£ 83 0 0	£ 104 0 0	£ 141 0 0	£ 172 0 0	£ 218 0 0	
Derbyshire Stones	£ 49 0 0	£ 60 0 0	£ 73 0 0	£ 90 0 0	£ 125 0 0	£ 152 0 0	£ 190 0 0	
Mills without Stones	£ 44 0 0	£ 53 0 0	£ 63 0 0	£ 77 0 0	£ 111 0 0	£ 132 0 0	£ 164 0 0	
Self-contained Dresser	£ 14 10 0	£ 16 10 0	£ 16 10 0	£ 22 0 0	Not fitted to these Mills.			
Crane for lifting Stones	£ 7 10 0	£ 7 10 0	£ 7 10 0	£ 8 15 0	£ 7 10 0	£ 7 10 0	£ 8 15 0	
Driving Strap	£ 3 5 0	£ 3 5 0	£ 5 0 0	£ 5 0 0	£ 6 10 0	£ 7 10 0	£ 7 10 0	
Mill for grinding Maize, attached to Stone Case	One No. 1 Mill.	One No. 1 Mill.	One No. 1 Mill.	One No. 2 Mill.	Two No. 1 Mills.	Two No. 1 Mills.	Two No. 2 Mills.	
Packing Mill	£ 6 10 0	£ 6 10 0	£ 6 10 0	£ 8 10 0	£ 13 0 0	£ 13 0 0	£ 17 0 0	
Nett Weight	£ 4 0 0	£ 5 5 0	£ 5 15 0	£ 7 0 0	£ 10 10 0	£ 11 10 0	£ 14 0 0	
	24 cwt.	31 cwt.	44 cwt.	65 cwt.	59 cwt.	80 cwt.	125 cwt.	

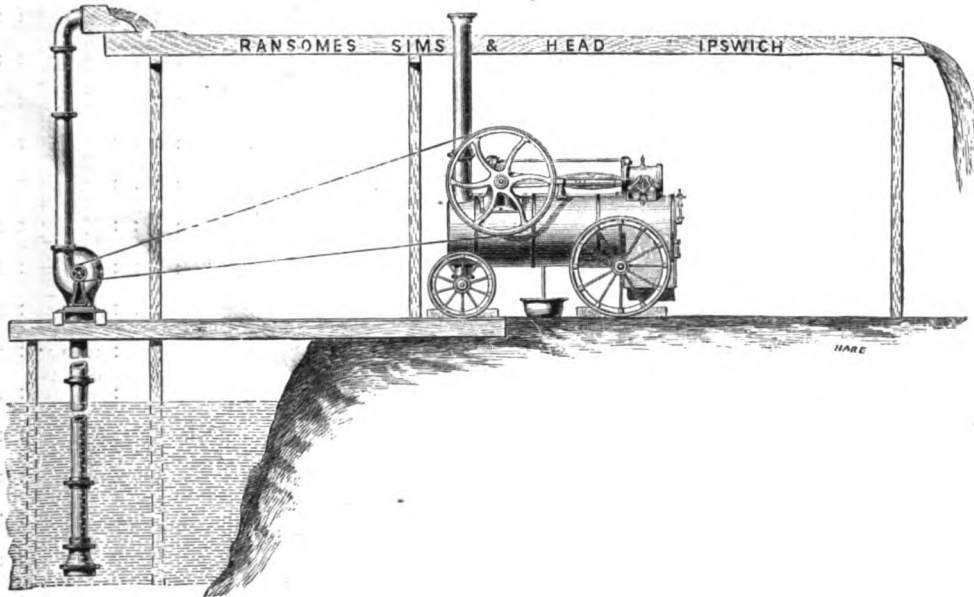
Approximate quantity of Flour ground per Hour by each Mill.	30 inches.	36 inches.	42 inches.	48 inches.
Quantity of corn ground per hour	2½ bush.	3½ bush.	4 bush.	5 bush.
Produce of meal from ditto	145 lb.	190 lb.	240 lb.	300 lb.
Produce of fine dressed flour from ditto, for making bread	90 lb.	120 lb.	150 lb.	180 lb.
Quantity of corn ground into coarse meal, for cattle feeding	5 bush.	6½ bush.	8 bush.	10 bush.
Produce of flour from ditto for cattle-feeding purposes	300 lb.	390 lb.	490 lb.	610 lb.
Average power of portable engine required, including dressing apparatus	2½ h.-p.	3 h.-p.	4 h.-p.	5 h.-p.

When required, these Mills can be fitted with apparatus for breaking up maize or Indian corn into small pieces about the size of a grain of corn. This Machine is a necessary addition to all Mills used in hot countries, where maize flour forms one of the principal articles of food, and with this arrangement Indian corn may be ground as rapidly as any other description of grain.

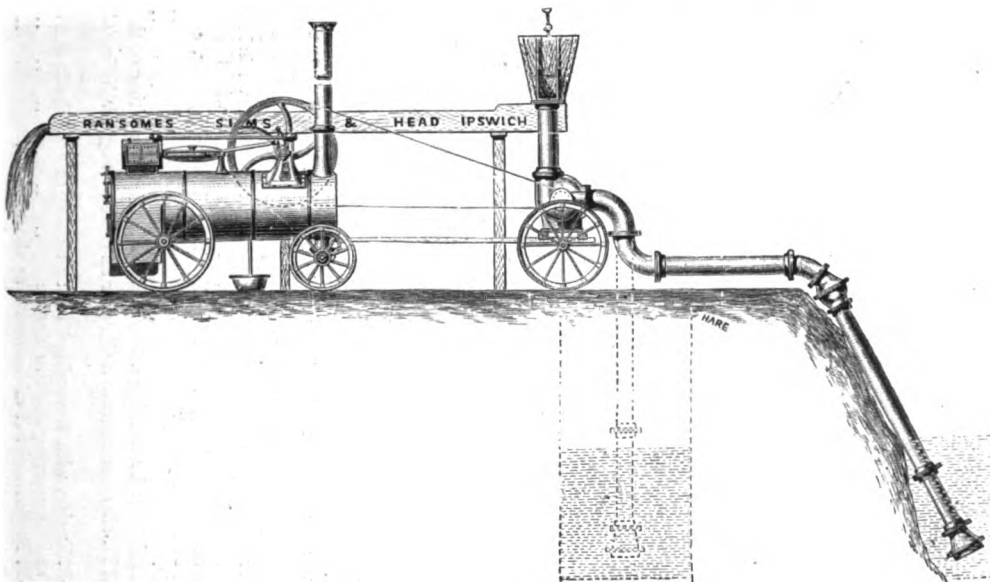
RANSOMES, SIMS, AND HEAD,
ORWELL WORKS, IPSWICH.

PUMPING MACHINERY FOR IRRIGATION.

FIXED PUMPING MACHINERY, CLASS A.



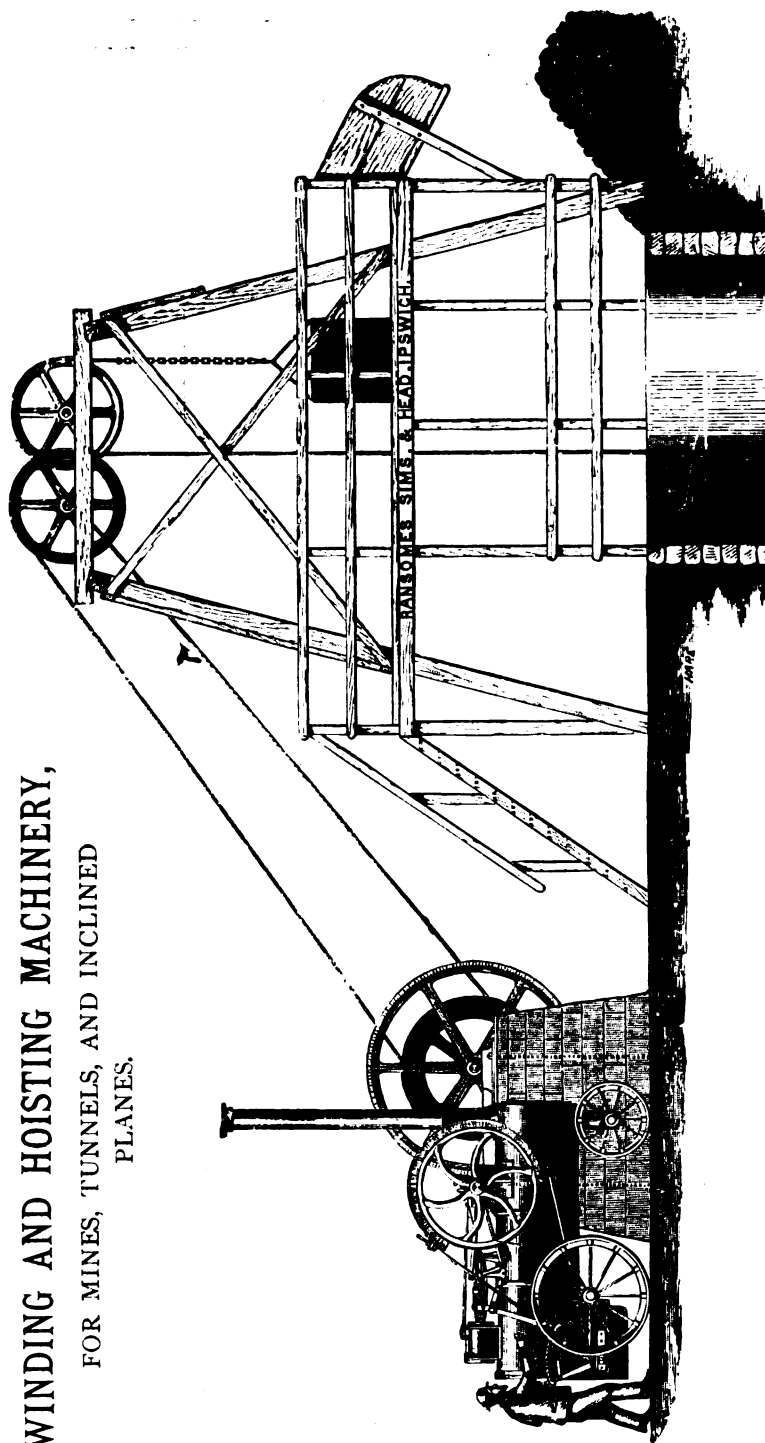
PORTABLE PUMPING MACHINERY, CLASS C.



Prices will be furnished on application. When ordering, it is necessary to state the average distance between Pump and Water, the greatest depth of suction at low water, the height of delivery between Pump and Reservoir, and the maximum quantity of water required to be delivered at maximum lift.

RANSOMES, SIMS, AND HEAD,
ORWELL WORKS, IPSWICH.

WINDING AND HOISTING MACHINERY, FOR MINES, TUNNELS, AND INCLINED PLANES.



In above arrangement the Engine is of the Portable Expansion class, fitted with a Link-Motion Reversing Gear and a powerful Brake to the Fly Wheel. The Engine stands upon its wheels, or may be set upon pedestals, and is coupled to the first-motion shaft of the winding gear by means of a strong Connector with universal joints, all in wrought iron. The winding gear has drums 6 feet in diameter, with wood beds for the rope to coil upon; a strong brake is fitted to the drums for use in case of accident to the gearing; the hand lever is brought within reach of the engine driver; the pulleys over the pit are 6 feet in diameter, and are shaped to receive a round wire rope. The Prices vary with the power of Engine employed, and are as follows:

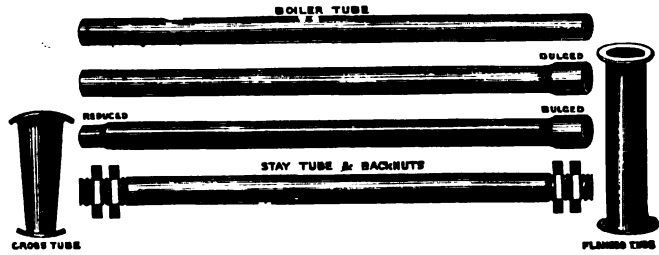
12 H.-P. Double-Cylinder Expansion Engine and Winding Gear, complete, packed and delivered to London	£827
10 H.-P. Single-Cylinder	695
8 H.-P.	648
Additional Gear for working a Pump may be adapted to either of the above at an extra cost of..	125

R., S., and H. also manufacture a Cheaper and more Simple Winding Gear, adapted to be worked by a 6, 8, or 10 H.-P. Engine, the Prices of which, packed and delivered to London, are:

6 H.-P. Engine, with Reversing Gear and Brake to Fly Wheel, and Set of Ironwork for large Double-Winding Drums, Shafts, Plummer Blocks, and Connecting Shaft to Engine	£420
8 H.-P. Engine and Set of Ironwork, as above	460
10 H.-P.	500
If fitted with a Pump, extra	85
Pulleys for fixing over the Pit, if required	25
The Naves, Spokes, and Shrouds of the Winding Drums are made of iron; if the Wood Sheathing for the bed of the ropes is supplied, extra	30

RANSOMES, SIMS, AND HEAD,
ORWELL WORKS, IPSWICH.

LAP-WELDED IRON BOILER TUBES, STAYS, AND NUTS.



GROSS PRICES PER FOOT OF LAP-WELDED IRON BOILER TUBES.

External diameter in inches	1½	1¾	1⅞	2	2½	2¾	2⅞	3	3½	3¾	4	4½	4¾	5
Usual B. W. Gauge	14	13	13	13	12	12	12	11	11	11	11	10	10	10
Price per foot of usual B. W. Gauge	9½d	9¾d	10d	10½d	11d	11½d	1/0	1/1	1/1½	1/3	1/4½	1/8	1/9½	1/11
Do. 1 extra Gauge thicker	10¾d	11¼d	11½d	1/0	1/0½	1/0¾	1/1	1/1½	1/2	1/3	1/4½	1/6½	1/10	2/0
Do. 2 ditto ditto	1/0	1/0½	1/0¾	1/1	1/1½	1/2	1/2½	1/3½	1/4½	1/6	1/8	2/0	2/2½	2/4
Do. 3 ditto ditto	1/1½	1/1¾	1/1½	1/2	1/2½	1/3½	1/4	1/5½	1/6½	1/8½	1/10½	2/2½	2/4½	2/6½
Do. ⅜ inch thick	1/5½	1/5½	1/5½	1/6	1/6½	1/6½	1/6½	1/7	1/8	1/10	2/0½	2/2½	2/4½	2/6½

External diameter in inches	5	5½	5¾	6	6½	6¾	7	7½	8	8½	9	9½	10	11	12
Usual B. W. Gauge	8	8	7	7	7	7	7	7	5	4	3½	3½	3½	3½	3
Price per foot of usual B. W. Gauge	3/8	4/0	4/7	5/0	5/3	5/9	6/6	6/9	7/0	9/4	10/9	13/4	14/9	17/0	18/3
Do. 1 extra Gauge thicker	4/0	4/4	5/2	5/7	5/11	6/6	7/4	7/7	8/0	10/0	The Discount quoted for 1½ "to 7½" inclusive does not apply to the above larger sizes. Special quotations given.				
Do. 2 ditto ditto	4/6	4/11	5/7	6/1	6/5	7/0	7/11	8/2	8/9	11/0					
Do. 3 ditto ditto	4/10	5/4	6/0	6/7	7/0	7/7	8/7	8/10	9/6	11/9					
Do. ⅜ inch thick	4/0	4/4	4/7	5/0	5/3	5/9	6/6	6/9	7/0	9/4					

GROSS PRICES PER FOOT FOR IRON TUBULAR SCREWED STAYS, INCLUSIVE OF 11 INCHES OF SCREWING.

External diameter in inches										2	2½	2¾	2⅞	3	3½	3¾	3⅞	4	4½	4¾	4⅞	5
½ Thick	2/2	2/3	2/4	2/5	2/7	2/9	3/1	3/4	3/7	3/11	4/4	4/9	5/0	5/4	6/0							
⅜ Thick	2/6	2/7½	2/9	2/10	2/11	3/3	3/8	4/0	4/4	4/8	5/2	5/8	6/1	6/7	7/2							
⅜ Thick	3/4	3/7	3/10	4/2	4/7	5/0	5/6	6/0	6/6	7/0	7/7	8/7	9/4	10/4	11/4							

Tubes of intermediate diameter to be charged at the same price as the next larger size. Maximum length, 16 feet.

GROSS PRICES PER FOOT FOR IRON TUBULAR STAYS, NOT SCREWED.

External diameter in inches										2	2½	2¾	2⅞	2½	2¾	3	3½	3¾	3⅞	4	4½	4¾	4⅞	5
¾ Thick	2/0	2/1	2/2	2/3	2/5	2/7	2/10	3/1	3/4	3/8	4/0	4/5	4/8	5/0	5/8									
⅝ Thick	2/4	2/5½	2/7	2/8	2/9	3/1	3/5	3/9	4/1	4/5	4/10	5/4	5/9	6/3	6/10									
⅜ Thick	3/2	3/5	3/8	4/0	4/5	4/10	5/3	5/9	6/3	6/9	7/3	8/3	9/0	10/0	11/0									

Lengths in excess of maximum lengths at special prices. All orders where Gauge is not specified will be executed according to the usual Gauge on this list.

No extra charge for Tubes swelled ⅜ inch at one end and 3 inches up. Extra swelling to be charged 12s. per 100 ends gross per ⅜ and 3 inches long, up to 4 inches diameter. Tubes of larger diameter at special prices.

GROSS PRICES OF STAY BACKNUTS AND SCREWING STAYS IN EXCESS OF 11 INCHES OF SCREW.

External diameter in inches	2	2 $\frac{1}{8}$	2 $\frac{1}{4}$	2 $\frac{3}{8}$	2 $\frac{1}{2}$	2 $\frac{3}{4}$	3	3 $\frac{1}{4}$	3 $\frac{1}{2}$	3 $\frac{3}{4}$	4	4 $\frac{1}{4}$	4 $\frac{1}{2}$	4 $\frac{3}{4}$	5
Screwed Nuts, each	1/0	1/0	1/2	1/3	1/5	1/6	1/10	2/3	2/8	3/0	3/5	3/9	4/2	4/8	5/3
Screwing Stays, per lineal inch	1 $\frac{1}{2}$ d.	1 $\frac{1}{2}$ d.	2d.	2d.	2 $\frac{1}{2}$ d.	2 $\frac{1}{2}$ d.	3d.	3d.	3 $\frac{1}{2}$ d.	3 $\frac{1}{2}$ d.	4d.	4d.	5d.	5d.	5d.

Stays of intermediate thickness to be charged at the next thickest size.

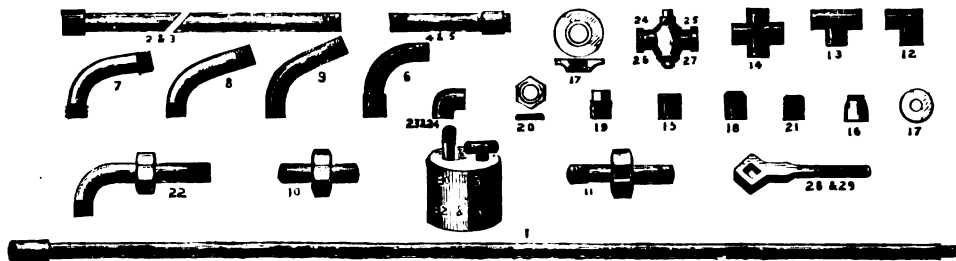
Stock of ordinary sizes kept at Gas and Boiler Tube Warehouse, Vine Street, Minories, E.C.

Discount, per cent.

ALEXANDER ANDERSON,

OFFICE: 9, LONDON STREET. WAREHOUSE: VINE STREET, MINORIES, LONDON, E.C.

WELDED IRON TUBES AND FITTINGS, FOR GAS, STEAM, AND WATER.



PRICES.

TUBES.

Internal diameter.		$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	3	$3\frac{1}{2}$	4
1	Tubes, from 2 to 14 ft. long .. per ft.	0/2 $\frac{1}{2}$	0/3	0/3 $\frac{1}{2}$	0/4 $\frac{1}{2}$	0/6	0/8	0/11	1/2	1/6	1/9	2/6	3/3	4/0	4/6	5/6	7/0
2	Pieces 12 ,, 23 $\frac{1}{2}$ in. long .. each	0/4	0/5	0/7	0/9	1/0	1/4	1/8	2/0	2/6	3/0	4/6	6/3	7/6	9/0	11/6	14/6
3	Ditto 3 ,, 11 $\frac{1}{2}$,, ..	0/2	0/3	0/4	0/6	0/8	0/11	1/1	1/4	2/0	2/3	4/0	4/9	6/0	7/0	8/0	9/0
4	Long Screws 12 to 23 $\frac{1}{2}$,, ..	0/5	0/7	0/9	0/11	1/2	1/6	2/0	2/6	3/3	4/0	5/6	7/0	8/6	10/0	12/6	15/6
5	Ditto 3 to 11 $\frac{1}{2}$,, ..	0/4	0/5	0/6	0/8	0/10	1/0	1/3	2/0	2/6	3/0	4/6	5/6	6/6	7/6	8/6	10/0
6	Bends	0/5 $\frac{1}{2}$	0/6 $\frac{1}{2}$	0/7	0/8	0/11	1/3	1/9	2/3	3/3	4/3	6/6	10/0	12/0	16/0	25/0	32/6
7, 8, 9	Springs, not socketed ..	0/4	0/5	0/6	0/7	0/9	0/11	1/4	1/8	2/6	3/3	5/6	7/6	10/0	12/0	19/0	26/0

FITTINGS.

10, 11, Socket Union, Pipe Union .. each	..	2/0	2/6	3/0	4/0	5/6	6/9	8/0	9/0	10/0	12/0	14/0	16/0	18/0	22/0	28/0
12 Elbows	0/6	0/6½	0/7	0/8	0/10	1/2	1/9	2/3	3/0	3/6	5/6	8/6	11/0	14/0	22/0	28/0
13 Tees	0/6	0/6½	0/7	0/9	1/0	1/3	1/9	2/6	3/0	3/9	6/0	9/6	12/6	16/6	24/0	30/0
14 Crosses	0/10	1/0	1/0	1/5	1/9	2/3	3/0	3/6	4/6	5/3	10/6	16/0	21/0	30/0	42/0	50/0
15 Plain Sockets	0/1½	0/1½	0/2	0/3	0/3½	0/4	0/6	0/7	0/9	1/0	1/6	2/6	3/0	3/6	5/0	6/0
16 Diminished Sockets	..	0/3	0/4	0/5	0/6	0/7	0/9	0/11	1/1	1/3	2/0	3/0	4/0	5/0	7/0	9/0
17 Flanges	0/8	0/9	0/10	1/0	1/2	1/4	1/6	1/9	2/0	2/6	3/9	5/0	6/9	8/6	10/0	11/6
18, 19 Caps and Plugs	0/2	0/3	0/3	0/4	0/5	0/6	0/8	0/10	1/0	1/3	2/0	2/6	3/6	4/9	7/0	10/0
20, 21 Backnuts and Nipples	0/1	0/2	0/2	0/3	0/3½	0/4	0/6	0/8	0/10	1/0	1/9	2/3	3/0	3/6	4/6	5/6
22 Union Bends	..	2/6	3/0	3/9	5/0	6/3	8/6	10/0	11/6	13/6	16/0	19/0	22/0	25/0	30/0	36/0
23 Round Elbows	0/7	0/7	0/8	0/9	1/0	1/4	1/11	2/6	3/4	3/10	6/6	10/0	13/0	16/0	25/0	32/0
24 Iron Main Cocks	2/3	2/3	2/9	3/6	4/6	6/6	8/6	11/0	14/0	18/0	27/0	36/0	44/0	50/0	75/0	90/0
25 Ditto ,, with Brass Plugs	..	..	4/6	5/6	7/6	10/6	15/0	19/6	25/0	32/0	47/0	60/0	90/0	110/0	140/0	190/0
26 Round-way Iron Cocks	..	..	3/6	4/0	5/6	7/6	10/0	13/0	17/6	22/0	38/0	54/0	62/0	70/0	100/0	160/0
27 Ditto ,, with Brass Plugs	..	..	5/0	6/9	0/9	13/0	19/0	28/0	36/0	42/0	60/0	85/0	105/0	120/0	180/0	280/0
28 Cock Spanners, Wrought Iron	..	..	1/0	1/4	1/8	2/0	2/4	3/0	3/6	4/0	4/9	6/0	7/6	9/0	12/0	14/0
29 Ditto Malleable Cast Iron	..	..	0/7	0/8	0/10	1/2	1/8	2/2	2/9	3/3	4/9	6/0	7/6	9/0	12/0	14/0
30 Syphon Boxes, 1 quart	..	..	..	11/0	12/0	13/0	14/0	15/0	15/6	16/0	18/0	..	..	..	..	..
31 Ditto 2 ,,	..	..	..	..	16/0	17/0	18/0	19/0	21/0	23/0	25/0	30/0	35/0	40/0	..	..
32 Ditto 3 ,,	..	..	..	..	..	20/0	22/0	24/0	25/0	26/6	28/0	32/0	35/0	40/0	45/0	50/0
33 Ditto 4 ,,	..	..	..	..	..	..	21/0	23/0	25/0	27/0	29/0	31/0	34/0	38/0	42/0	47/0
34 Malleable Cast Round Elbows	0/6	0/6½	0/7	0/8	0/10	1/2	1/9	2/3	3/0	3/6	5/6	9/0	12/0	15/0	30/3	40/0

Corebars, Hydraulic and Hot-Water Pipes, and Best Stocks for Engineers, with Improved Fluted Taps to Order.

NOTE.—This List applies to Tubes up to 14 feet; if longer lengths are required, Prices will be given on application.

Prices will be quoted when required for Tubes of any size or thickness not enumerated in this List. Tubes of intermediate diameters will be charged at the next higher rate.

Delivered in London, Liverpool, Hull, and Bristol. Carriage paid only on lots of £2 and upwards.

Stock of ordinary sizes kept at Gas and Boiler Tube Warehouse, Vine Street, Minorities, E.C.

Discount, per cent.

ALEXANDER ANDERSON,

OFFICE: 9, LONDON STREET. WAREHOUSE: VINE STREET, MINORITIES, LONDON, E.C

per lb.

$1\frac{5}{8}$ in. to 4 in. diameter outside, inclusive, to 14 w.g.
 $1\frac{5}{8}$ „ to $1\frac{1}{4}$ „ „ „ „ „ „ „ „ ..
 $\frac{1}{2}$ d. per lb. extra for each gauge thinner.

per lb.

1½ in.	to ¾ in.	diameter outside, inclusive, to No. 19 w.g., not exceeding 12 ft. in length
¾ "	to ⅝ "	" " " " " " " "
⅝ "	to ⅜ "	" " " " " " " "
⅜ "	to ⅓ "	" " " " " " " "
⅓ "	to ⅔ "	" " " " " " " "
⅔ "	to 1 1/8 "	" " " " " " " "
1 1/8 "	to 1 1/4 "	" " " " " " " "
1 1/4 "	to 1 3/4 "	" " " " " " " "
1 3/4 "	to 2 "	" " " " " " " "
2 "	to 2 1/2 "	" " " " " " " "
2 1/2 "	to 3 "	" " " " " " " "
3 "	to 3 1/2 "	" " " " " " " "
3 1/2 "	to 4 "	" " " " " " " "
4 "	to 4 1/2 "	" " " " " " " "
4 1/2 "	to 5 "	" " " " " " " "
5 "	to 5 1/2 "	" " " " " " " "
5 1/2 "	to 6 "	" " " " " " " "
6 "	to 6 1/2 "	" " " " " " " "
6 1/2 "	to 7 "	" " " " " " " "
7 "	to 7 1/2 "	" " " " " " " "
7 1/2 "	to 8 "	" " " " " " " "
8 "	to 8 1/2 "	" " " " " " " "
8 1/2 "	to 9 "	" " " " " " " "
9 "	to 9 1/2 "	" " " " " " " "
9 1/2 "	to 10 "	" " " " " " " "
10 "	to 10 1/2 "	" " " " " " " "
10 1/2 "	to 11 "	" " " " " " " "
11 "	to 11 1/2 "	" " " " " " " "
11 1/2 "	to 12 "	" " " " " " " "
12 "	to 12 1/2 "	" " " " " " " "
12 1/2 "	to 13 "	" " " " " " " "
13 "	to 13 1/2 "	" " " " " " " "
13 1/2 "	to 14 "	" " " " " " " "
14 "	to 14 1/2 "	" " " " " " " "
14 1/2 "	to 15 "	" " " " " " " "
15 "	to 15 1/2 "	" " " " " " " "
15 1/2 "	to 16 "	" " " " " " " "
16 "	to 16 1/2 "	" " " " " " " "
16 1/2 "	to 17 "	" " " " " " " "
17 "	to 17 1/2 "	" " " " " " " "
17 1/2 "	to 18 "	" " " " " " " "
18 "	to 18 1/2 "	" " " " " " " "
18 1/2 "	to 19 "	" " " " " " " "
19 "	to 19 1/2 "	" " " " " " " "
19 1/2 "	to 20 "	" " " " " " " "
20 "	to 20 1/2 "	" " " " " " " "
20 1/2 "	to 21 "	" " " " " " " "
21 "	to 21 1/2 "	" " " " " " " "
21 1/2 "	to 22 "	" " " " " " " "
22 "	to 22 1/2 "	" " " " " " " "
22 1/2 "	to 23 "	" " " " " " " "
23 "	to 23 1/2 "	" " " " " " " "
23 1/2 "	to 24 "	" " " " " " " "
24 "	to 24 1/2 "	" " " " " " " "
24 1/2 "	to 25 "	" " " " " " " "
25 "	to 25 1/2 "	" " " " " " " "
25 1/2 "	to 26 "	" " " " " " " "
26 "	to 26 1/2 "	" " " " " " " "
26 1/2 "	to 27 "	" " " " " " " "
27 "	to 27 1/2 "	" " " " " " " "
27 1/2 "	to 28 "	" " " " " " " "
28 "	to 28 1/2 "	" " " " " " " "
28 1/2 "	to 29 "	" " " " " " " "
29 "	to 29 1/2 "	" " " " " " " "
29 1/2 "	to 30 "	" " " " " " " "
30 "	to 30 1/2 "	" " " " " " " "
30 1/2 "	to 31 "	" " " " " " " "
31 "	to 31 1/2 "	" " " " " " " "
31 1/2 "	to 32 "	" " " " " " " "
32 "	to 32 1/2 "	" " " " " " " "
32 1/2 "	to 33 "	" " " " " " " "
33 "	to 33 1/2 "	" " " " " " " "
33 1/2 "	to 34 "	" " " " " " " "
34 "	to 34 1/2 "	" " " " " " " "
34 1/2 "	to 35 "	" " " " " " " "
35 "	to 35 1/2 "	" " " " " " " "
35 1/2 "	to 36 "	" " " " " " " "
36 "	to 36 1/2 "	" " " " " " " "
36 1/2 "	to 37 "	" " " " " " " "
37 "	to 37 1/2 "	" " " " " " " "
37 1/2 "	to 38 "	" " " " " " " "
38 "	to 38 1/2 "	" " " " " " " "
38 1/2 "	to 39 "	" " " " " " " "
39 "	to 39 1/2 "	" " " " " " " "
39 1/2 "	to 40 "	" " " " " " " "
40 "	to 40 1/2 "	" " " " " " " "
40 1/2 "	to 41 "	" " " " " " " "
41 "	to 41 1/2 "	" " " " " " " "
41 1/2 "	to 42 "	" " " " " " " "
42 "	to 42 1/2 "	" " " " " " " "
42 1/2 "	to 43 "	" " " " " " " "
43 "	to 43 1/2 "	" " " " " " " "
43 1/2 "	to 44 "	" " " " " " " "
44 "	to 44 1/2 "	" " " " " " " "
44 1/2 "	to 45 "	" " " " " " " "
45 "	to 45 1/2 "	" " " " " " " "
45 1/2 "	to 46 "	" " " " " " " "
46 "	to 46 1/2 "	" " " " " " " "
46 1/2 "	to 47 "	" " " " " " " "
47 "	to 47 1/2 "	" " " " " " " "
47 1/2 "	to 48 "	

per lb.

3 in. to 1 1/2 in. diameter outside, inclusive, to 14 w.g.	..	..	..	..	..	..	..	..	..
1 1/2 " to 1 " "	"	"	"	"	"	..	..	..	..
1 " to 1 1/2 " "	"	"	"	"	"	..	..	..	..
1 1/2 " to 1 3/4 " "	"	"	"	"	"	..	..	..	..
1 3/4 " to 3 1/2 " "	"	"	"	"	"	..	..	..	..
3 1/2 " to 4 1/2 " "	"	"	"	"	"	..	..	..	..
4 1/2 " to 5 " "	"	"	"	"	"	..	..	..	..
5 " to 5 1/2 " "	"	"	"	"	"	..	..	..	..
5 1/2 " to 6 " "	"	"	"	"	"	..	..	..	..

Id. per lb. extra for each gauge thinner.

per lb.

1 1/4 in.	to 3/4 in.	diameter outside, inclusive, to 19 w.g., not exceeding 12 ft. in length
3/4 "	to 5/8 "	" " " " " "
5/8 "	to 1/2 "	" " " " 20 " "

Id. per lb. extra for each gauge thinner.

per lb.

3 in. to 5 in. diameter outside, inclusive	..	..	..	..	..	..	..	..
5 in. to 6 in. " " " "	..	..	..	..	..	..	..	..
6 in. to 8 in. " " " "	..	..	..	..	..	..	..	..
8 in. to 10 in. " " " "	..	..	..	..	..	..	..	..
10 in. to 12 in. " " " "	..	..	..	..	..	..	..	..
12 in. to 14 in. " " " "	..	..	..	..	..	..	..	..
14 in. to 16 in. " " " "	..	..	..	..	..	..	..	..
16 in. to 18 in. " " " "	..	..	..	..	..	..	..	..
18 in. to 20 in. " " " "	..	..	..	..	..	..	..	..
20 in. to 22 in. " " " "	..	..	..	..	..	..	..	..
22 in. to 24 in. " " " "	..	..	..	..	..	..	..	..
24 in. to 26 in. " " " "	..	..	..	..	..	..	..	..
26 in. to 28 in. " " " "	..	..	..	..	..	..	..	..
28 in. to 30 in. " " " "	..	..	..	..	..	..	..	..
30 in. to 32 in. " " " "	..	..	..	..	..	..	..	..
32 in. to 34 in. " " " "	..	..	..	..	..	..	..	..
34 in. to 36 in. " " " "	..	..	..	..	..	..	..	..
36 in. to 38 in. " " " "	..	..	..	..	..	..	..	..
38 in. to 40 in. " " " "	..	..	..	..	..	..	..	..
40 in. to 42 in. " " " "	..	..	..	..	..	..	..	..
42 in. to 44 in. " " " "	..	..	..	..	..	..	..	..
44 in. to 46 in. " " " "	..	..	..	..	..	..	..	..
46 in. to 48 in. " " " "	..	..	..	..	..	..	..	..
48 in. to 50 in. " " " "	..	..	..	..	..	..	..	..
50 in. to 52 in. " " " "	..	..	..	..	..	..	..	..
52 in. to 54 in. " " " "	..	..	..	..	..	..	..	..
54 in. to 56 in. " " " "	..	..	..	..	..	..	..	..
56 in. to 58 in. " " " "	..	..	..	..	..	..	..	..
58 in. to 60 in. " " " "	..	..	..	..	..	..	..	..
60 in. to 62 in. " " " "	..	..	..	..	..	..	..	..
62 in. to 64 in. " " " "	..	..	..	..	..	..	..	..
64 in. to 66 in. " " " "	..	..	..	..	..	..	..	..
66 in. to 68 in. " " " "	..	..	..	..	..	..	..	..
68 in. to 70 in. " " " "	..	..	..	..	..	..	..	..
70 in. to 72 in. " " " "	..	..	..	..	..	..	..	..
72 in. to 74 in. " " " "	..	..	..	..	..	..	..	..
74 in. to 76 in. " " " "	..	..	..	..	..	..	..	..
76 in. to 78 in. " " " "	..	..	..	..	..	..	..	..
78 in. to 80 in. " " " "	..	..	..	..	..	..	..	..
80 in. to 82 in. " " " "	..	..	..	..	..	..	..	..
82 in. to 84 in. " " " "	..	..	..	..	..	..	..	..
84 in. to 86 in. " " " "	..	..	..	..	..	..	..	..
86 in. to 88 in. " " " "	..	..	..	..	..	..	..	..
88 in. to 90 in. " " " "	..	..	..	..	..	..	..	..
90 in. to 92 in. " " " "	..	..	..	..	..	..	..	..
92 in. to 94 in. " " " "	..	..	..	..	..	..	..	..
94 in. to 96 in. " " " "	..	..	..	..	..	..	..	..
96 in. to 98 in. " " " "	..	..	..	..	..	..	..	..
98 in. to 100 in. " " " "	..	..	..	..	..	..	..	..

per lb.

[illegible]

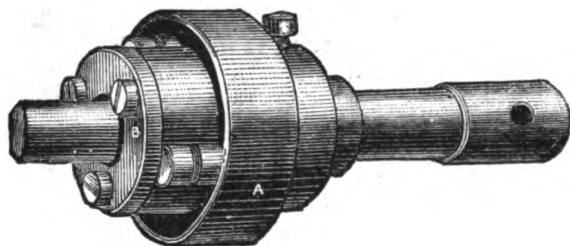
Maximum length, 15 feet. *Id.* extra per foot for each foot above 10 feet.

External Diam. in in.	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	3	$3\frac{1}{4}$	$3\frac{1}{2}$	$3\frac{3}{4}$	4	$4\frac{1}{4}$	$4\frac{1}{2}$	$4\frac{3}{4}$	5	$5\frac{1}{4}$	$5\frac{1}{2}$	$5\frac{3}{4}$	6	$6\frac{1}{4}$	$6\frac{1}{2}$	$6\frac{3}{4}$	7	$7\frac{1}{4}$	$7\frac{1}{2}$	$7\frac{3}{4}$	8	$8\frac{1}{4}$	$8\frac{1}{2}$	$8\frac{3}{4}$	9	$9\frac{1}{4}$	$9\frac{1}{2}$	$9\frac{3}{4}$	10	$10\frac{1}{4}$	$10\frac{1}{2}$	$10\frac{3}{4}$	11	$11\frac{1}{4}$	$11\frac{1}{2}$	$11\frac{3}{4}$	12	$12\frac{1}{4}$	$12\frac{1}{2}$	$12\frac{3}{4}$	13	$13\frac{1}{4}$	$13\frac{1}{2}$	$13\frac{3}{4}$	14	$14\frac{1}{4}$	$14\frac{1}{2}$	$14\frac{3}{4}$	15	$15\frac{1}{4}$	$15\frac{1}{2}$	$15\frac{3}{4}$	16	$16\frac{1}{4}$	$16\frac{1}{2}$	$16\frac{3}{4}$	17	$17\frac{1}{4}$	$17\frac{1}{2}$	$17\frac{3}{4}$	18	$18\frac{1}{4}$	$18\frac{1}{2}$	$18\frac{3}{4}$	19	$19\frac{1}{4}$	$19\frac{1}{2}$	$19\frac{3}{4}$	20	$20\frac{1}{4}$	$20\frac{1}{2}$	$20\frac{3}{4}$	21	$21\frac{1}{4}$	$21\frac{1}{2}$	$21\frac{3}{4}$	22	$22\frac{1}{4}$	$22\frac{1}{2}$	$22\frac{3}{4}$	23	$23\frac{1}{4}$	$23\frac{1}{2}$	$23\frac{3}{4}$	24	$24\frac{1}{4}$	$24\frac{1}{2}$	$24\frac{3}{4}$	25	$25\frac{1}{4}$	$25\frac{1}{2}$	$25\frac{3}{4}$	26	$26\frac{1}{4}$	$26\frac{1}{2}$	$26\frac{3}{4}$	27	$27\frac{1}{4}$	$27\frac{1}{2}$	$27\frac{3}{4}$	28	$28\frac{1}{4}$	$28\frac{1}{2}$	$28\frac{3}{4}$	29	$29\frac{1}{4}$	$29\frac{1}{2}$	$29\frac{3}{4}$	30	$30\frac{1}{4}$	$30\frac{1}{2}$	$30\frac{3}{4}$	31	$31\frac{1}{4}$	$31\frac{1}{2}$	$31\frac{3}{4}$	32	$32\frac{1}{4}$	$32\frac{1}{2}$	$32\frac{3}{4}$	33	$33\frac{1}{4}$	$33\frac{1}{2}$	$33\frac{3}{4}$	34	$34\frac{1}{4}$	$34\frac{1}{2}$	$34\frac{3}{4}$	35	$35\frac{1}{4}$	$35\frac{1}{2}$	$35\frac{3}{4}$	36	$36\frac{1}{4}$	$36\frac{1}{2}$	$36\frac{3}{4}$	37	$37\frac{1}{4}$	$37\frac{1}{2}$	$37\frac{3}{4}$	38	$38\frac{1}{4}$	$38\frac{1}{2}$	$38\frac{3}{4}$	39	$39\frac{1}{4}$	$39\frac{1}{2}$	$39\frac{3}{4}$	40	$40\frac{1}{4}$	$40\frac{1}{2}$	$40\frac{3}{4}$	41	$41\frac{1}{4}$	$41\frac{1}{2}$	$41\frac{3}{4}$	42	$42\frac{1}{4}$	$42\frac{1}{2}$	$42\frac{3}{4}$	43	$43\frac{1}{4}$	$43\frac{1}{2}$	$43\frac{3}{4}$	44	$44\frac{1}{4}$	$44\frac{1}{2}$	$44\frac{3}{4}$	45	$45\frac{1}{4}$	$45\frac{1}{2}$	$45\frac{3}{4}$	46	$46\frac{1}{4}$	$46\frac{1}{2}$	$46\frac{3}{4}$	47	$47\frac{1}{4}$	$47\frac{1}{2}$	$47\frac{3}{4}$	48	$48\frac{1}{4}$	$48\frac{1}{2}$	$48\frac{3}{4}$	49	$49\frac{1}{4}$	$49\frac{1}{2}$	$49\frac{3}{4}$	50	$50\frac{1}{4}$	$50\frac{1}{2}$	$50\frac{3}{4}$	51	$51\frac{1}{4}$	$51\frac{1}{2}$	$51\frac{3}{4}$	52	$52\frac{1}{4}$	$52\frac{1}{2}$	$52\frac{3}{4}$	53	$53\frac{1}{4}$	$53\frac{1}{2}$	$53\frac{3}{4}$	54	$54\frac{1}{4}$	$54\frac{1}{2}$	$54\frac{3}{4}$	55	$55\frac{1}{4}$	$55\frac{1}{2}$	$55\frac{3}{4}$	56	$56\frac{1}{4}$	$56\frac{1}{2}$	$56\frac{3}{4}$	57	$57\frac{1}{4}$	$57\frac{1}{2}$	$57\frac{3}{4}$	58	$58\frac{1}{4}$	$58\frac{1}{2}$	$58\frac{3}{4}$	59	$59\frac{1}{4}$	$59\frac{1}{2}$	$59\frac{3}{4}$	60	$60\frac{1}{4}$	$60\frac{1}{2}$	$60\frac{3}{4}$	61	$61\frac{1}{4}$	$61\frac{1}{2}$	$61\frac{3}{4}$	62	$62\frac{1}{4}$	$62\frac{1}{2}$	$62\frac{3}{4}$	63	$63\frac{1}{4}$	$63\frac{1}{2}$	$63\frac{3}{4}$	64	$64\frac{1}{4}$	$64\frac{1}{2}$	$64\frac{3}{4}$	65	$65\frac{1}{4}$	$65\$
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Intermediate Diameters will be charged next higher rate. Thinner sizes and other variations by special quotations.
Discount. per cent.

2 B 2

DUDGEON'S PATENT ROLLER TUBE EXPANDER.

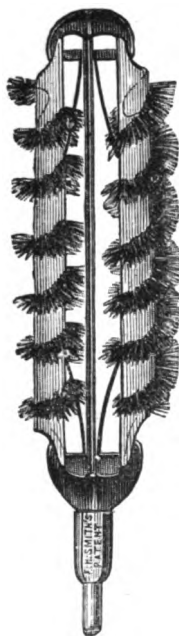


PRICES.

1 in. £3	1½ in. £3	1¾ in. £3	1½ in. £3	1¾ in. £3 10s.
1¾ in. £3 12s. 6d.	1¾ in. £3 12s. 6d.	2 in. £4 4s.	2½ in. £4 10s.	2½ in. £5
2½ in. £6	2½ in. £6 10s.	2½ in. £7	3 in. £8	3½ in. £8 15s.
3½ in. £8 15s.	3½ in. £10	3½ in. £11	3½ in. £11	4 in. £12
4½ in. £14	4½ in. £14	5 in. £17 10s.	6 in. £18 10s.	7 in. £25

These dimensions refer to *external* diameter of Tubes.

EXPANDING TUBE BRUSHES.

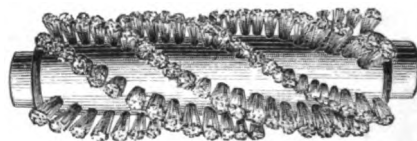


Diameter.	Brushes, per pair.	Stems, each.	Complete.
inches.	s. d.	s. d.	s. d.
1½	3 0	1 6	4 6
1¾	3 4	1 6	4 10
2	3 8	1 10	5 6
2½	4 0	1 10	5 10
2½	4 6	1 10	6 4
2½	5 0	1 10	6 10
3	5 6	1 10	7 4
3½	6 0	1 10	7 10
3½	6 6	2 3	8 9
3½	7 0	2 3	9 3
4	7 6	2 3	9 9

SPIRAL TUBE
BRUSH.

Whalebone, 22s. per doz.
Iron Wire, 23s. "
Brass .. 30s. "
Fibre .. 18s. "

SOLID TUBE BRUSHES.



Diameter.	Fibre.	Bristle.	Diameter.	Fibre.	Bristle.
inches.	s. d.	s. d.	inches.	s. d.	s. d.
2	1 0	1 9	3½	1 10	2 9
2½	1 2	2 0	3½	2 0	2 10
2½	1 4	2 2	3½	2 2	3 0
2½	1 6	2 4	4	3 4	3 2
3	1 8	2 6			

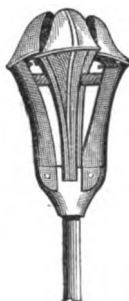
COLLICOTT'S

PATENT TUBE SCRAPER.

FOR CLEANING MARINE, PORTABLE, LOCOMOTIVE, AND STATIONARY BOILERS.

This Scraper is the best in use for the following reasons:

1. For its simplicity of construction, greater durability, and effectiveness.
2. The Scraping Edges are of chilled iron—harder than hardened steel.
3. The temper does not draw with the heat as with Steel Scrapers.
4. It is always expanded ready for use, being nearly as easy to operate as a Wire Brush, and will outwear several of them.



5. When pushed through the tube it never catches at the rear end.
6. When in the tube it is a perfect fit (contracting closer to the centre than any other Scraper made), thereby removing all scale and ashes without the use of a whalebone brush so often used after scraping.
7. No part of the Scraper comes in contact with the tube to create friction, except the scraping edge.
8. This Scraper has sufficient elasticity to pass over any roughness in the tube that cannot be scraped off, which is not the case with any Steel Scraper made.

Price 4s. per inch, from 2 inch and upwards. Discount, per cent.

Each Scraper stamped with *outside* diameter of Tube.

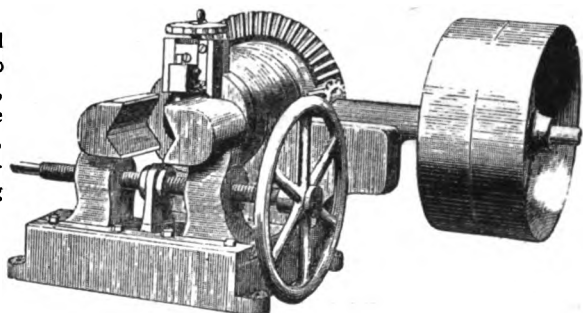
ALEXANDER ANDERSON,

OFFICE: 9, LONDON STREET. WAREHOUSE: VINE STREET, MINORIES, LONDON, E.C.

PATENT BEVIL-GEARED TUBE CUTTER.

Its utility and economical working may be appreciated by the fact that, with a D size machine, more than 400 lengths of 2-inch iron tube can be cut off in ten hours, and by the E size more than 200 lengths of 4-inch in the same time. Brass tubing, such as for locomotive boilers, is cut by the machine with astonishing celerity and regularity, and no locomotive, marine, or gas engineering works can be complete without them.

THE MACHINES ARE MADE SO AS TO BE DRIVEN
EITHER BY HAND OR BY POWER.

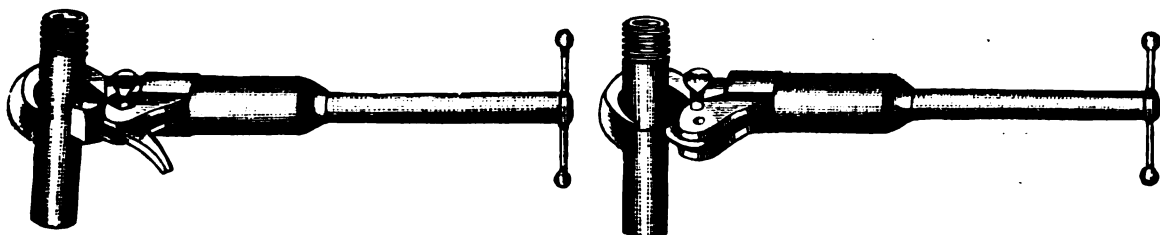


D	Size to cut from	1½ to 2½ inches, outside diameter	.. .. .	Price £14
E	" "	1½ " 5 "	"	" 25
F	" "	2½ " 6 "	"	" 29
Driving pulleys D size should run 100 revolutions per minute.				
"	"	E " "	105 " "	"
"	"	F " "	95 " "	"

PATENT COMBINED GAS-TUBE CUTTER AND WRENCH.

AS WRENCH.

AS CUTTER.



No. 1.	½ in. to 1 in.	.. .. .	£0 16s. 6d. each.	Extra Cutters, No. 1.	.. .. .	1s. 0d. each.
" 2.	1½ " 2 in.	.. .. .	1 6s. 0d. "	" "	2.	1s. 6d. "
" 3.	2½ " 3½ in.	.. .. .	1 16s. 6d. "	" "	3.	1s. 6d. "

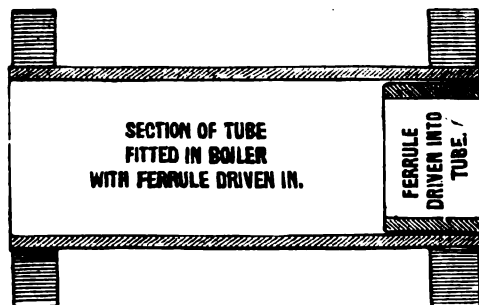
This Cutter is a very simple and effective tool for the purpose, and is very strong and durable. It entirely dispenses with the necessity of carrying more than two sizes, to cut off or grip all size tubes from ½ to 2 inch.

PATENT BOILER TUBE FERRULES.

Largest external diam. in inches	1½	1¾	1½	1¾	2	2½	2¾	2½	2¾	2½	2¾
Thickness Birmingham W.G.	12	12	12	12	11	11	11	11	11	10	10
Iron, per 1000	150/	150/	157/6	165/	180/	195/	210/	225/	240/	255/	270/
Steel, per 1000	202/6	202/6	202/6	217/6	232/6	255/	270/	285/	300/	315/	337/6

Largest external diam. in inches	2½	3	3½	3½	3¾	3½	3¾	3½	3¾	4
Thickness Birmingham Wire Gauge	10	10	9	9	9	9	9	8	8	8
Iron, per 1000	285	307/6	330/	352/6	375/	397/6	420/	442/6	495/	517/6
Steel, per 1000	360	382/6	412/6	442/6	465/	495/	517/6	547/6	600/	645/

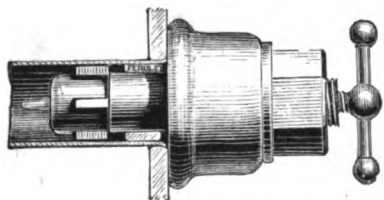
Discount, per cent.



ALEXANDER ANDERSON,

OFFICE: 9, LONDON STREET. WAREHOUSE: VINE STREET, MINORIES, LONDON, E.C.

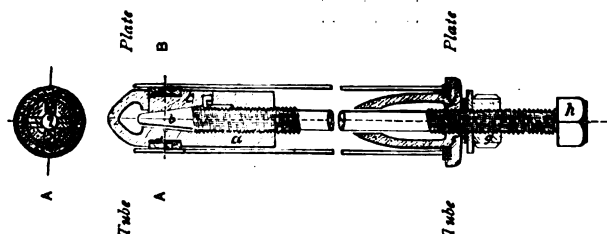
TUBE FERRULE EXTRACTOR.



No.	Inter. Diam.	£	s.	d.	No.	Inter. Diam.	£	s.	d.
1	For 1 in.	3	0	0	10	For 2½ in.	5	15	0
2	" 1½ "	3	5	0	11	" 3 "	6	0	0
3	" 1¾ "	3	10	0	12	" 3½ "	6	10	0
4	" 1¾ "	3	15	0	13	" 4 "	6	15	0
5	" 1¾ "	4	0	0	14	" 4½ "	7	0	0
6	" 2 "	4	10	0	15	" 5 "	7	5	0
7	" 2½ "	4	15	0	16	" 6 "	8	0	0
8	" 2½ "	5	0	0	17	" 7 "	9	0	0
9	" 2½ "	5	10	0	18	" 8 "	10	0	0

TUBE
EXTRACTOR
FOR
CONDENSER
TUBES,
£1 per Set.

SISSON'S PATENT EXPANDING TUBE PLUG AND STOPPER.



The great importance of this Patent Expanding Plug will at once be seen by all practical men interested in steam shipping, and its suitability will be apparent, as a burst tube can at sea be immediately stopped without reducing the pressure or drawing fires, thus avoiding a great waste of time, and also will be the means of obviating the necessity of steamers putting into any port to repair the tubes, as has frequently been the case hitherto. The Patent Plug and Stopper can remain in until the vessel arrives at her destination, and there the tube can be replaced or a common Plug used, leaving the Patent Plug and Stopper available for immediate future use.

When once tried, no steam-ship owner would send his vessels to sea without a supply on board.

Price £1 5s. each.

For orders, give length of Tube and inside diameter.

EADES' PATENT PULLEY BLOCKS.

These Blocks sustain the load if the chain is loosed, and lift much easier than any other Blocks.

One man can lift a ton with a set of Ton Blocks.

No. 3 are made with Sprocket Wheel.

No. 1.

Tested to	½	¾	1	1½	2	3	4	tons.
Price of Block	12/6	20/	30/	40/	50/	100/	120/	
" Chains	2/	2/	3/	3/4	3/8	4/4	5/	per foot of lift.

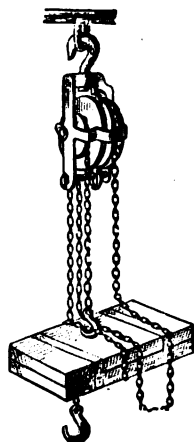
Including Hand Chain for each foot the Block is required to lift.

No. 3.

Tested to	2	3	4	5	6	8	10	tons.
Price of Block	85/	115/	140/	200/	240/	320/	400/	
" Chains	3/8	4/4	5/5	6/	9/4	12/	14/	per foot of lift.

Including Hand Chain for each foot the Block is required to lift.

In ordering, please give Lift required.



WESTON'S DIFFERENTIAL PULLEY BLOCK.

Tested to	5	10	12	20	30	40	cwt.
Bright BB	12/6	20/	20/	30/	40/	50/	per set.
Chain.	6d.	6d.	7d.	9d.	10d.	11d.	per ft.

WITH RATCHET.

By which one man can lift the weight specified.

Tested to	1	1½	2	3	tons.
Bright BB	50/	60/	70/	100/	per set.
Chain.	9d.	10d.	11d.	1/1	per foot.

Rope extra.

N.B.—The Sheaves of the 1, 1½, and 2 tons, are now CHILLED.

PULLEY WITH SPROCKET WHEEL.

Tested to	2	3	4	tons.
Bright BB	75/	110/	135/	per set.
Chain.	11d.	1/1	1/3	per foot.

PULLEY WITH TANGYE'S PATENT GEAR.

Tested to	Price of Block per Set.	Bright BB Chains per Foot.	
4 tons.	135/	1/3	Superior Rope made especially for these Pulley Blocks, extra.
5 "	200/	1/6	
6 "	240/	2/4	
8 "	320/	3/	
10 "	400/	3/6	

In ordering either kind, please specify height of Lift, or state what Chain is required. Weston's Block, when worked from above with Ratchet or Sprocket, takes about three times the length of Lift; when worked from below, by pulling the Chain, about four times the length of Lift required.

Discount, per cent.

ALEXANDER ANDERSON,
OFFICE: 9, LONDON STREET. WAREHOUSE: VINE STREET, MINORIES, LONDON, E.C.



BEST LONDON-PATTERN PULLEY BLOCKS.



These Blocks are made with turned Shafts and bright turned and bored Pulleys ; each Plate forms a support for the centre Shaft. The eye for end of rope is supplied to Block with least number of Sheaves to each pair ordered. The Grooves are all wider than size given in List, to allow for new rope being larger.

Diameter of Pulley	2½	3	3½	4	4½	5	6	7	8	9	10	11	12	14	15	16 in.
Width of Groove	× ¾	× ¾	× ¾	× ¾	× ¾	× ¾	× 1	× 1¼	× 1½	× 1¾	× 2	× 2¼	× 2½	× 2¾	× 3	× 3½ in.
Snatch Block—Price	6/0	6/0	6/0	7/0	8/0	11/6	13/6	16/6	21/6	32/6	60/0	80/0	110/0	140/0	170/0	210/0
Average Weight in lbs. ..	1¾	3½	3½	6	10	12½	15¾	23½	37	37	70					
1-Sheave Block—Price	4/0	4/6	4/6	5/9	7/6	10/	11/6	14/0	19/0	30/0	52/6	72/0	98/0	110/0	130/0	164/0
Average Weight in lbs. ..	1½	3½	3½	4¾	8	13½	14	20	36	36	62					
2-Sheave—Price	5/6	7/0	7/0	8/6	11/0	15/6	17/0	24/6	35/6	50/0	98/0	124/0	144/0	170/0	203/0	242/0
Average Weight in lbs. ..	2	5¾	5¾	9	15	20½	25	38	59	80	115					
3-Sheave—Price	7/0	8/6	8/6	10/6	14/0	19/6	21/6	30/6	48/6	70/0	127/0	157/0	190/0	222/6	262/0	310/0
Average Weight in lbs. ..	3	7½	7½	12	19	27½	37	50	78	108	155					
4-Sheave—Price	8/6	10/0	10/0	12/6	18/6	25/6	28/6	46/0	63/0	92/6	157/0	190/0	222/6	280/0	352/0	400/0
Average Weight in lbs. ..	4	8	8	11½	25	36	47	68	110	142	195					
Brass Sheave Blocks—per Sheave extra	9d.	1/6	1/6	2/0	3/0	4/6	6/3	7/9	11/6	15/3	21/6					

The 10 x 2 in. Pulley Blocks, and all larger sizes, are made with Rings instead of Hooks. All parts can be had in duplicate, as they are interchangeable. The above weights are not guaranteed, but given as a guide to Purchasers.

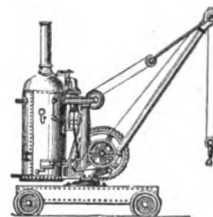
IMPROVED PORTABLE STEAM-CRANE.

SUITABLE FOR WHARF OR RAILWAY.

* This Improved Portable Steam-Crane is fitted on a Wrought-Iron Carriage, and may either have Roadway or Flanged Railway Wheels. The Foot Brake, Starting Handles, &c., are all conveniently arranged, to enable the Crane to be under the easy control of one man. The Engine and Boiler swing completely round on the Central Pillar, and help to counterbalance the load. The Jib is adjustable. All the Cranes are made to hoist, lower, and turn round by steam. These Cranes are manufactured of the best materials, the whole working parts being accurately fitted by the aid of the most improved machinery. In the construction of these Cranes strict attention has been given that every part possesses ample strength. The Central Pillar is made of wrought iron, the advantage of which over the ordinary cast-iron column must be at once apparent. The Boiler is fitted with Cross Tubes, which entirely prevent priming. All the Cranes are fitted with Link Motion.

		PRICES.		Single Cylinder.		Double Cylinder.	
To Hoist, with Return Chain and Block, up to 2 tons	..	..	£280	..	..	..	—
"	"	3	"	..	..	..	£360
"	"	4	"	..	..	..	425
"	"	5	"	..	..	..	485
"	"	7	"	..	..	..	540

Larger Sizes in proportion.



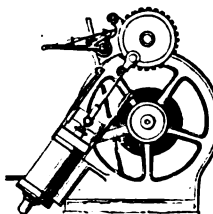
IMPROVED STEAM WINCH.

SUITABLE FOR SHIPS' DECKS, CONTRACTORS, SHIPBUILDERS, WAREHOUSES, ETC.

The Winch is fitted with a Pair of Cylinders, Link Motion for Reversing, Double Purchase Motion, powerful Brake for Lowering, and with all the necessary Clutches, Handles, &c., within easy reach of the operator. The parts subject to most strain are made of best cast malleable iron; the wearing parts are all fitted with suitable adjustments to enable the effects of tear and wear to be easily and speedily remedied. The whole working parts are of ample strength, and carefully and accurately fitted by the aid of the most improved machinery.

Two Handles are provided, to enable the Winch to be worked by Hand Power when the steam is down. Boilers can be supplied if required.

PRICES.					
Steam Winch, with Two Cylinders, 5 in. diameter and 10 in. stroke	..	..	..	..	£75
" " 6 " "	..	..	..	..	86
" " 7 " "	..	..	..	..	98
" " 8 " "	..	..	..	..	120



ALEXANDER ANDERSON.

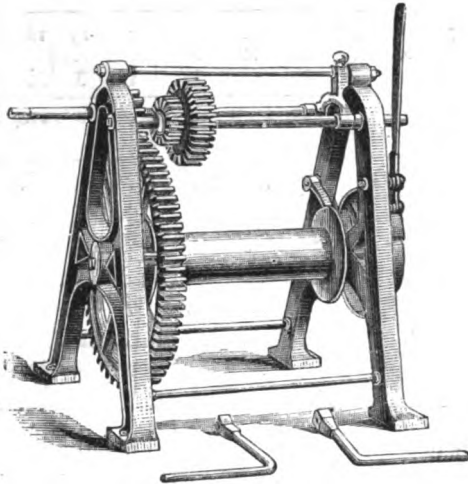
OFFICE: 9, LONDON STREET. WAREHOUSE: VINE STREET, MINORIES, LONDON, E.C.

HOISTING CRABS.

Handles do not revolve when lowering by the Brake. Shafts are turned, the Bearings bored. Steel Keys, &c.

These Crabs will lift direct from the barrel fully one-third the weights given.

SPECIAL QUOTATION GIVEN FOR LARGER SIZES.



SINGLE PURCHASE.

No.	To lift with 2 and 3 Sheave Pulley Blocks.	Price with Brake.	Price without Brake.
1	1 ton.	£4 2 6	£3 0 0
2	1½ "	4 12 6	3 7 6
3	2 "	5 10 0	4 5 0
4	3 "	6 10 0	5 0 0
5	4 "	7 15 0	6 5 0
6	6 "	8 15 0	7 5 0

DOUBLE PURCHASE.

1	2 tons.	6 10 0	5 5 0
2	8 "	7 10 0	6 0 0
3	4 "	8 17 6	7 7 6
4	6 "	9 17 6	8 5 0
5	8 "	12 0 0	10 0 0
6	10 "	15 15 0	13 12 0
7	12 "	19 10 0	17 5 0

Discount, per cent.

IMPROVED PORTABLE STEAM HOISTING ENGINE,

SPECIALLY SUITABLE FOR DISCHARGING VESSELS, DRIVING PUMPS, HOISTING SAILS, LIFTING ANCHOR, AND FOR SHIP'S DECK PURPOSES GENERALLY.

This Improved Steam-Winch has been constructed specially with the view of meeting all the requirements on a ship's deck and working it there with perfect safety. It is made portable, the carriage being fitted with wheels, either flanged for rails or plain for an ordinary roadway, and is thus equally well suited for the hoisting operations of the builder or contractor.

The Engine is made of various sizes, the smallest of which will raise weights up to 12 cwt. at a speed of from 40 to 50 feet per minute; the largest size will raise weights of 45 cwt. at the same speed. Each Engine is fitted with Link Motion for Reversing, and powerful Friction Brake.

A new arrangement of Valve Gear is introduced, whereby a separate handle for the steam valve is dispensed with.

The Engine is worked exclusively by the reversing handle, and this is so connected with the steam valves that in lifting the load that amount of steam necessary to perform the work is admitted to the cylinder, and no more. Another great advantage peculiar to this Winch is that the valves are arranged to prevent the Engine stopping on the centres, thus giving to the single cylinder the advantages in this respect possessed by an engine having double cylinders. The working parts are reduced in number, and are so simple that it is almost impossible for those unacquainted with machinery to have the least difficulty in working the Engine.

The Clutch for throwing the Engine in or out of gear enables the man working the Engine to have entire control over it without risk of the barrel slipping. A Chain Pulley is fixed on the Barrel Shaft, which can be used separately for driving pumps, lifting anchor, hoisting sails, &c. The ends of the Barrel Shaft are extended, on which are fixed Cones, which revolve with the Barrel Shaft, but not with the Barrel. These Cones are found very useful for many deck purposes. The Handles for reversing and for throwing the Clutch out or in gear, as well as the Foot Lever for Brake, are all within easy reach of each other. The Engine and Boiler are securely fixed to a Wrought-Iron Carriage, which also forms the Tank for supplying the Boiler with water.

The Boiler is provided with Cross Tubes, and is fitted with Steam Gauge, Glass Water-Gauge, Two Pet Cocks, Blow-off Cock, Man Hole, Sludge Holes, and Two Safety Valves, one of which is loaded to 50 lb. per square inch, and locked up, and is thus entirely out of the control of anyone but the holder of the key.

Ring Bolts are fitted to the Carriage, by which it can be secured to the deck. Similar Bolts are fitted to the Boiler, by which it can be stayed if found necessary.

PRICES.

Steam Winch, as above described, to hoist up to 12 cwt.	.. .. .	£138
" " " 22 "	.. .. .	170
" " " 35 "	.. .. .	210
" " " 45 "	.. .. .	255

N.B.—These Engines can be made Self-Propelling at 5 per cent. extra to Price List.

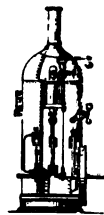
ALEXANDER ANDERSON,

OFFICE: 9, LONDON STREET. WAREHOUSE: VINE STREET, MINORIES, LONDON, E.C.

Improved High-Pressure Vertical Steam Engines and Boilers.

WITH CHIMNEY SHAFT, BASE PLATE, AND ASH PIT COMPLETE.

These Engines may be started at once, no Building whatever being required. The Engine is securely fitted to a strong Cast-Iron Frame detached from the Boiler. The Ash Pit is provided with a door for removing the ashes and regulating the draught, thus giving complete control over the power of producing Steam in the Boiler. These Engines possess various important advantages over the ordinary Stationary Horizontal Engines, several of which may be briefly stated. The space occupied by the former as compared with the latter is considerably less, thus rendering them available for many purposes where ordinary Engines cannot be used, while at the same time an important advantage is gained in their favour for Shipment, for Warehouses, and other places where space is limited. These Engines have only to be set down on a secure foundation, and the Feed-Water Pipe connected, when they are ready for work; they may be used without risk of fire on a wooden floor, with only, in such cases, the addition of an ordinary Water Ash Pan.



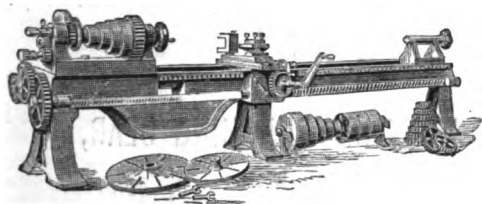
The Boilers are made with large Fire Boxes and Cross Tubes, the whole of the Heating Surface being exposed to the direct action of the Fire. Less fuel is consumed than in the ordinary Multitubular or Dome Boilers, while priming is entirely prevented. Every Boiler is tested by Hydraulic pressure to 200 lb. per square inch.

The Crank Shaft of these Engines is constructed to admit of the Fly Wheel being placed at either side, or on a Pulley at the side opposite the Fly Wheel to drive additional Machinery. The size of Cylinder and length of Stroke are given below. *It will be found that the Cylinders are larger, and the Engines consequently more powerful, than most other Engines of the same nominal Horse-power.*

The best materials, as well as the most improved Machinery, are used in the manufacture of these Engines. All the necessary Fittings are supplied without extra charge, such as Glass Water-Gauge, Safety Valve, Gauge Cocks, Pressure Gauge, Fire Bars, Fire Door, Blow-off Plug. The working parts are few, simple, easy of access, and very direct and efficient in action, while the finish is decidedly superior to what is usual on Engines of a similar form.

PRICES OF ENGINES AND BOILERS COMPLETE.

2 Horse-power, Cylinder 4½ in. × 9 in. Stroke	£ 92	7 Horse-power, Cylinder 8½ in. × 14 in. Stroke	£ 210
3 " " 5½ " 11 "	115	8 " " 9 " 14 "	230
4 " " 6½ " 13 "	140	9 " " 9½ " 16 "	250
5 " " 7½ " 14 "	155	10 " " 10½ " 16 "	270
6 " " 8 " 14 "	185	12 " " 11 " 18 "	305



SELF-ACTING SLIDE AND SCREW-CUTTING LATHES.

With Double-Geared Headstocks, Gap Beds, Compound Slide Rest, Adjustable Back-Stay, Face Plate, Catch Plate, set of 22 Change Wheels, Top Driving Apparatus, and Screw Keys complete.

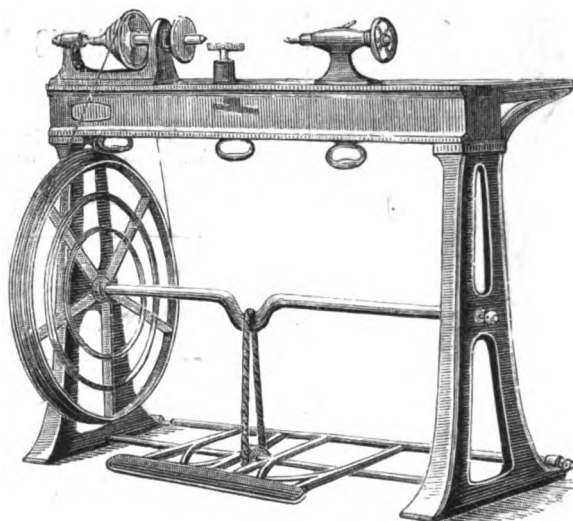
No.	Height of Centres.	Length of Bed.	Screw Cutting and Sliding by Screw.	Longer or Shorter Bed per Foot
	inches.	feet.	£	£ s. d.
1	6	6	52	2 6 0
2	7	7	58	2 17 6
3	8	8	63	3 9 0
4	9	9	69	4 0 0
5	10	10	104	4 12 6
6	12	12	127	5 15 0

AMATEURS' LATHE.—LONDON PATTERN.

Complete with Planed Bed (V and Flat), Treadle and Hook, Crank and Driving Wheel, Hand Rest, Driving Chuck, Drill Chuck, and Two Centres.

No. 4. 4 in. Centres (3 Speeds) 3 ft. 6 in. Bed	£ 9 15s.
" 5. 5 " " 4 " 3½ " 6 " " 11 0s.	
" 6. 5 " " 4 " 4 " Bed	11 10s.
Compound Slide Rests extra, 4 in. £ 4 5s., 5 in. £ 4 15s.	

FOOT LATHES.



Complete with Planed Bed, Standards, Anti-Friction Treadle with Chain, Crank and Driving Wheel, Hand Rest, Face Plate, Drill Chuck, and Two Centres.

Height of Centres ..	4	5	6	inches.
Length of Bed ..	3	4	5	feet.
No. 2. Single Speed ..	14 0	17 10	28 0	each
No. 3. Double Gear ..	17 5	24 5	34 10	"

ALEXANDER ANDERSON,

OFFICE: 9, LONDON STREET. WAREHOUSE: VINE STREET, MINORIES, LONDON. E.C.

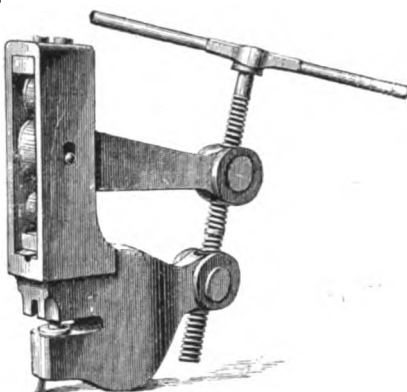
2 C

BAIRD'S PATENT LEVER PUNCHING BEAR,

FOR IRON SHIPBUILDERS, ENGINEERS, BOILERMAKERS, RAILWAY AND STEAMBOAT COMPANIES, BRIDGE GIRDER MAKERS, AND OTHERS.

The body of this PUNCHING BEAR has, after great experience, been brought up to the highest possible strength consistent with the least possible weight.

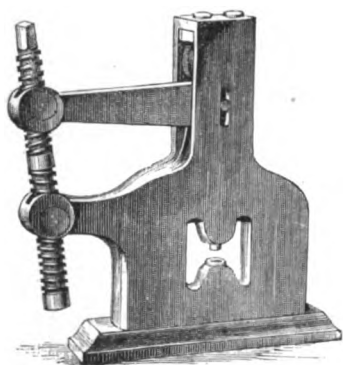
It is forged in a particular way from wrought iron specially selected and superior Welding Steel. The working parts are made of the finest Cast Steel, and well fitted. The mechanical arrangements are of such a nature that they are not liable to get out of repair; and the wear on the action is very slight, on account of the rolling motion given to the parts sustaining the actual pressure, thereby lessening the friction. The Screw Spindle will also stand constant work for a long time, as the strain is distributed equally



over its entire length by the power being greatest, and the downward motion of the Punch slowest, where it first comes in contact with the iron, the action gradually increasing in speed and decreasing in power as the Punch progresses through, so that the time lost at the beginning is fully made up at the end, when great power is not required.

SPECIAL PUNCHING BEAR
MADE FOR GALLOWAY TUBES AT
SAME PRICE AS BELOW.

Size.	Weight.	Diameter of Screw Spindle.	Diameter of Hole to be Punched.	Through Thickness of	Price of each.	PRICE OF EXTRA PUNCH OR BOLSTER, EACH : A 4s. B 5s. C 6s. D 7s.
Model.	lb.	inch.	inch.	inch.	£ s. d.	
A	20	$\frac{5}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	5 0 0	
B	38	$\frac{7}{8}$	$\frac{1}{4}$	$\frac{1}{4}$	7 10 0	
C	72	1	$\frac{1}{2}$	$\frac{1}{2}$	10 10 0	
D	92	1	$\frac{3}{4}$	$\frac{3}{4}$	12 0 0	
	112	$1\frac{1}{8}$	1	$\frac{5}{8}$	14 0 0	



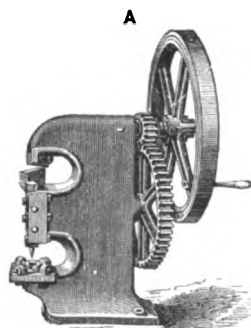
BAIRD'S CLOSE-MOUTHED PUNCHING BEAR,

FOR IRON OR STEEL RAILS

This Machine is also forged from the best selected Scrap Iron, and will be found invaluable for Railway Companies, on account of the great ease this motion gives in working over any other yet known, and the Machine not being liable to get out of repair.

Weight about.	Oblong Hole to be Punched.	Through Iron.	Through Steel.	Price.
150 lb.	$1\frac{1}{8}$ in. diam.	$\frac{1}{2}$ in. thick.	$\frac{3}{4}$ in. thick.	£30

PUNCHING AND SHEARING MACHINE.



No.	Will Punch Diam.	Through Plates Thick.	Distance from Edge of Plate.	Will Shear Bars Thick.	Approximate Weight.	Price to Work by Hand.	Price to Work by Power.
0	$\frac{1}{2}$ in.	$\frac{1}{2}$ in.	5	$\frac{1}{2}$ in.	5 cwt.	£ 25 17 6	£ 25 17 6
1	$\frac{3}{4}$ in.	$\frac{3}{4}$ in.	7	$\frac{3}{4}$ in.	10	40 5 0	40 5 0
2	$\frac{1}{2}$ in.	$\frac{1}{2}$ in.	8	$\frac{1}{2}$ in.	18	51 15 0	51 15 0
3	$\frac{3}{4}$ in.	$\frac{3}{4}$ in.	16	$\frac{3}{4}$ in.	21	63 5 0	63 5 0
4	$\frac{1}{2}$ in.	$\frac{1}{2}$ in.	11	$\frac{1}{2}$ in.	30	..	74 15 0
5	$\frac{3}{4}$ in.	$\frac{3}{4}$ in.	12	$\frac{3}{4}$ in.	41	..	97 15 0
6	$\frac{1}{2}$ in.	$\frac{1}{2}$ in.	10	$\frac{1}{2}$ in.	60	..	115 0 0

All are of similar design to the above, and have the Shear Blades set at an angle to cut Bars of any length.

ALEXANDER ANDERSON,

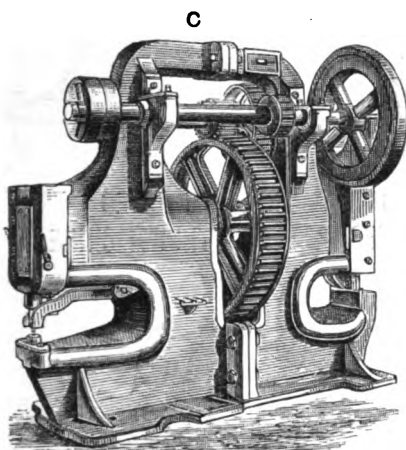
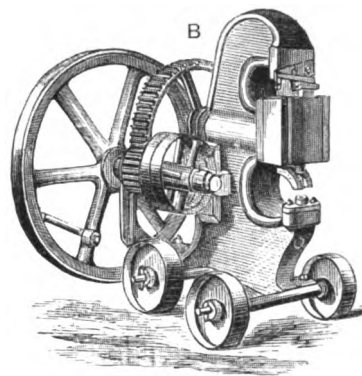
OFFICE: 9, LONDON STREET. WAREHOUSE: VINE STREET, MINORIES, LONDON, E.C.

PUNCHING AND SHEARING MACHINES.

No.	Will Punch Diam.	Will Shear and Punch through Plates Thick.	Depth of Gap, Shear, and Punch.	Approximate Weight.	Price to Work by Hand or Power.
1	in.	in.	in.	cwt.	£
2	$\frac{3}{4}$	$\frac{3}{4}$	10	30	46
3	$\frac{3}{4}$	$\frac{3}{4}$	8	22	35
3	$\frac{3}{4}$	$\frac{3}{4}$	15	40	67

No. 3 Machine has stop for Punch, and is not portable.

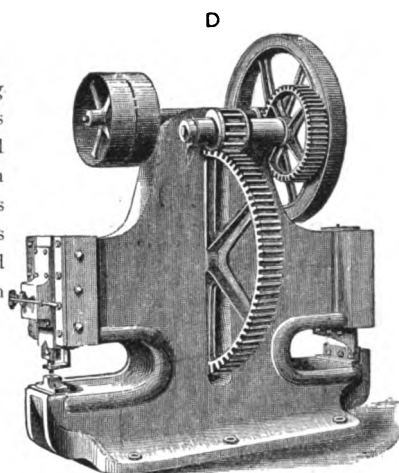
If to work by Hand only, price of Pulleys deducted.



No. 8.—Double Punching and Shearing Machine, as per this Engraving, will punch 1-inch hole through 1-inch plates, 18 inches from edge. Shear Blades are 12 inches long, and will cut 18 inches from edge.

Weight, 110 cwt.

Price, £195.



No.	Will Punch Holes Diam.	Will Shear and Punch through Plates Thick.	Depth of Gap, Shear, and Punch.	Approx. Weight.	Price.
1	in.	in.	in.	cwt.	£
2	$\frac{3}{4}$	$\frac{3}{4}$	18	90	138
3	$\frac{3}{4}$	$\frac{3}{4}$	20	120	178
4	$\frac{3}{4}$	$\frac{3}{4}$	22	190	244
5	$\frac{3}{4}$	$\frac{3}{4}$	24	240	298
5	$\frac{3}{4}$	$\frac{3}{4}$	24	360	528

Angle Iron Cutter, Engine, and Crane extra.

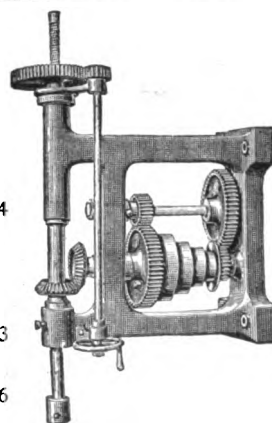
All these Machines have stop motion for punch.

WALL DRILLING MACHINE.

No. 9.—Single-Speed Wall Drilling Machine, to admit 5 ft. 4 in. dia., with 2-in. Spindle and 18-in. Hand Feed £34

No. 10.—Double-Geared Wall Drilling Machine, to admit 5 ft. 4 in. dia., with 2-in. Spindle and 18-in. Hand Feed .. 43

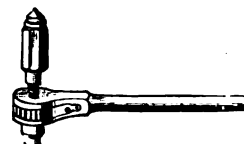
No. 10.—If fitted with Self-acting Feed Motion 46



No. 10

RATCHET BRACES.

12	14	16	18	22	24 inches.
20/-	22/-	24/-	28/-	32/-	36/- each.



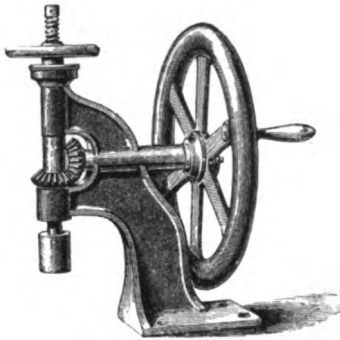
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2 C 2

DRILLING MACHINES.

HAND BENCH DRILLING MACHINE.



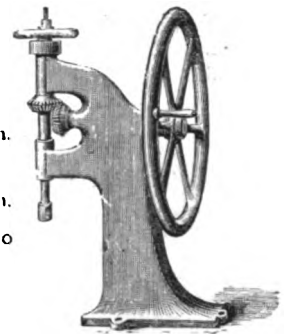
No. 1.—With Hand and Feed Wheel.

15 in high, 5 in. central,	57/6
20 " " 5½ " "	86/6
25 " " 6 " "	126/6
30 " " 7½ " "	170/-
36 " " 9½ " "	277/6

No. 2.—With Hand Wheel and Cone Pulley.

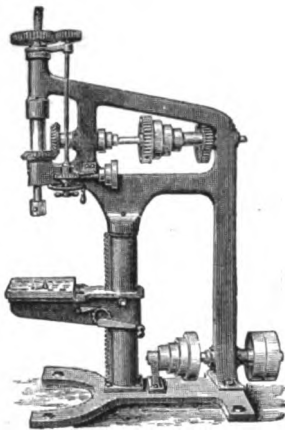
36 in. high, 12 in. centre,	300/-
42 " " 13 " "	415/-
48 " " 14 " "	530/-

IMPROVED BENCH DRILLING MACHINE.



30-in.
Height of Casting,
30 in. 42 in.
Admits in Diam.,
13 in. 22 in.
Price £8 10 £13 10

IMPROVED DRILLING MACHINE.

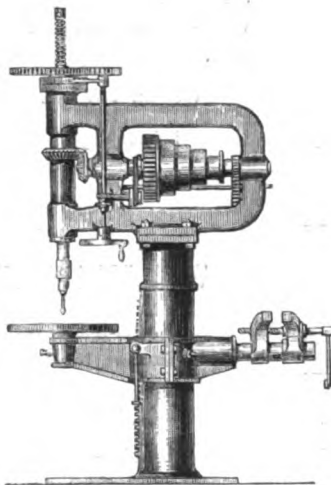


No. 5.

- No. 4.—Single Speed, to admit 24 in. dia., 1½-in. Spindle, 9-in. Feed £34
- No. 5.—Double Geared, to admit 24 in. dia., 1½-in. Spindle, 9-in. Feed 46
- No. 6.—Double Geared, to admit 30 in. dia., 2-in. Spindle, 12-in. Feed 63
- No. 7.—Double Geared, to admit 36 in. dia., 3-in. Spindle, 18-in. Feed 97
- No. 8.—Double Geared, to admit 42 in. dia., 4-in. Spindle, 21-in. Feed 120

All the above are fitted with Self-acting Feed Motion, and are of similar design to the No. 5 Machine.

STRONG DOUBLE-GEARED VERTICAL DRILLING MACHINES.



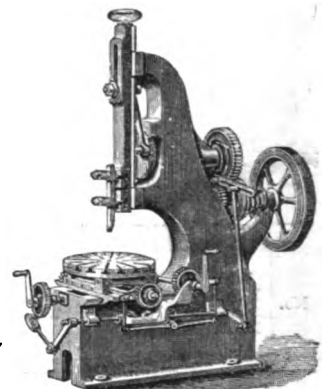
On Turned Columns, Spindles of best Cast Steel, with Self-acting Feed and Top Gear complete.

Diameter of Spindle.	Travel.	PRICE.
1½ in. ..	9 in. ..	£64
2 " ..	10 " ..	78
2½ " ..	14 " ..	115
3 " ..	18 " ..	172

Single ditto ditto, 1½-in. Spindle, 9-in. Travel, with Self-acting Feed, £55.

Vice extra.

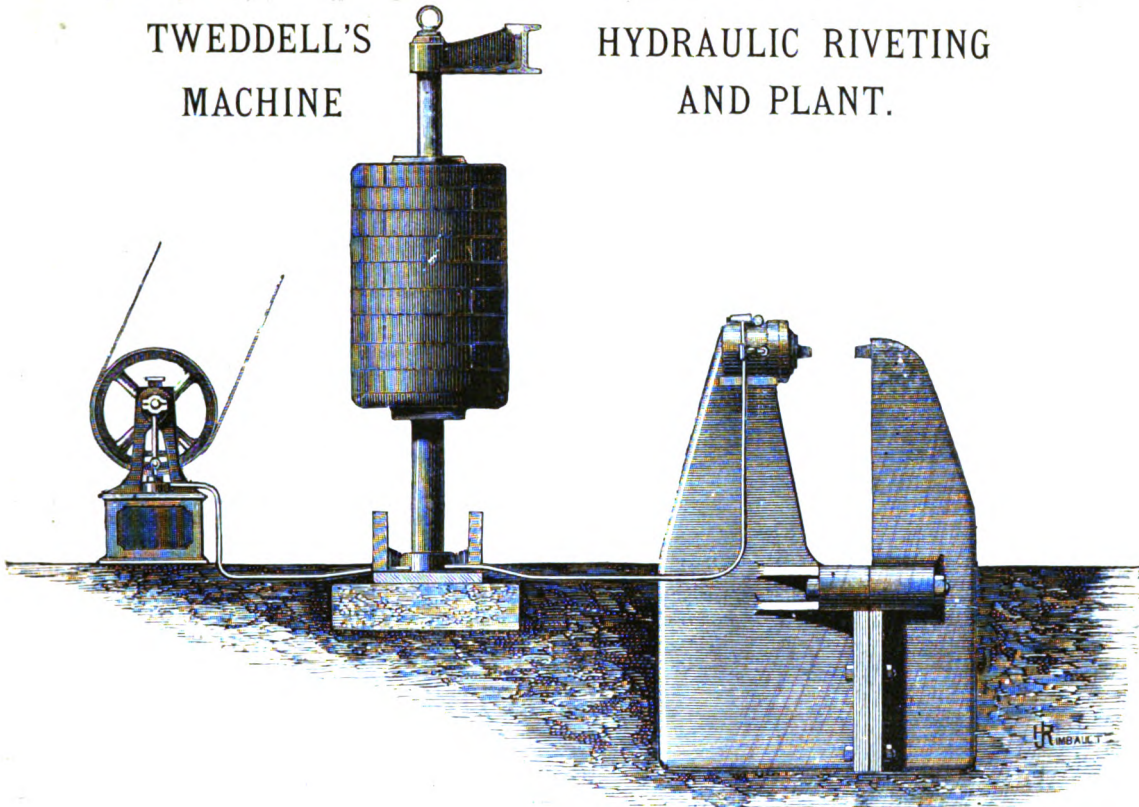
IMPROVED SLOTTING MACHINE.



- No. 1.—5-in. Stroke, to admit 28 in. dia., with Compound Table, the Top Slide by Hand, and the bottom one Self-acting. Weight, 10 cwt. £46
- No. 2.—8-in. Stroke, to admit 3 feet dia., with Circular Table 20 in. dia., Self-acting on all Cuts. Weight, 30 cwt. 103
- No. 3.—9-in. Stroke, to admit 3 feet 6 in. dia., with Circular Table 24 in. dia., Self-acting on all Cuts. Weight, 45 cwt. 138
- No. 4.—12-in. Stroke, to admit 4 feet 6 in. dia. Weight, 80 cwt. 210

ALEXANDER ANDERSON,

OFFICE: 9, LONDON STREET. WAREHOUSE: VINE STREET, MINORIES, LONDON, E.C.

TWEDDELL'S
MACHINEHYDRAULIC RIVETING
AND PLANT.

This Machine having proved itself not only specially adapted to the altered requirements of "Marine" Boiler construction, caused by the introduction of Compound Engines, but also equally suitable to **all classes of Land and Agricultural Boilers**, Ship and Bridge Work, the Inventor and Manufacturers would again call attention to the following **advantages** which it possesses, viz.:

I. The saving in first cost by the avoidance of **almost all foundations**, and the economical method in which the power is applied, compares most favourably with the heavy masonry and the extravagant expenditure of steam in the Steam Riveting Machines.

II. The pressure brought to bear on the rivet combines the character of **a blow and a squeeze**, and the power of retaining this pressure until the rivet is cold is, in the case of thick plates, a most important and valuable advantage; and since the stroke of riveting die adjusts itself to suit any **inequality in the length of rivet**, no fracture can ensue when the rivet is too long, and an equally close joint is made when the rivet is too short.

III. These machines can close twelve rivets per minute, a number which is found to afford ample margin over what is required in ordinary practice for boiler work. For girder work a greater speed can be obtained.

IV. The perfect silence in which the work is done, the economy in actual working expenses, especially in **decreased wear and tear of cupping dies**, the small amount of **wear and tear of machine itself**, owing to the **complete freedom from vibration**, are all points of great value, to which may be added the facility of applying the reserve of power contained in the accumulator to **Tweddell's Patent Portable Riveters, Shearing, and Punching Machines, Bending Presses**, and other hydraulic machinery.

These Machines are made to exert from 25 tons to 40 tons closing power on the rivet head, and from 4 feet 6 in. gap to 10 feet, which enables the whole of the shell of a massive boiler to be riveted at one lift. Machines at higher pressure can be made and estimated for, but the experience gained from many years' use and manufacture has proved that too much pressure is injurious, and 40 tons can do any work up to $1\frac{1}{2}$ -in. rivets and $1\frac{1}{2}$ -in. plates.

PRICE LIST FOR FIXED RIVETER.

Class.	Closing Pressure on Rivet Head.	Depth of Gap.	Price Complete, with Double Pumps and Accumulator.	Class.	Closing Pressure on Rivet Head.	Depth of Gap.	Price Complete, with Double Pumps and Accumulator.
A	25 Tons.	4 ft. 6 in.	£330	D	40 Tons.	4 ft. 6 in.	£440
A ²	25 "	4 " 6 "	360	F	40 "	5 " 0 "	470
B	25 "	5 " 0 "	350	K	40 "	5 " 6 "	500
B ²	25 "	5 " 0 "	400	G	30 "	5 " 0 "	430
C	25 "	6 " 0 "	400	H	30 "	10 " 0 "	740

Terms—Nett Cash, delivered F.O.B. River Tyne.

OBSERVE.—These Prices include Accumulator and Pumps, and the additional expense incurred for Foundations and Pipes is merely nominal.

A² and B² have wrought-iron holders-up and can take in small tubes or do small fire boxes.

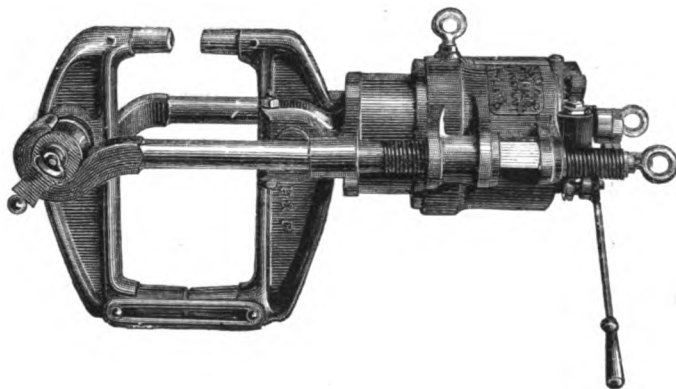
All these Machines are capable of having pressure on the rivet readily reduced when light work is required.

ALEXANDER ANDERSON,

OFFICE: 9, LONDON STREET. WAREHOUSE: VINE STREET, MINORIES, LONDON, E.C.

TWEDDELL'S PORTABLE HYDRAULIC RIVETER.

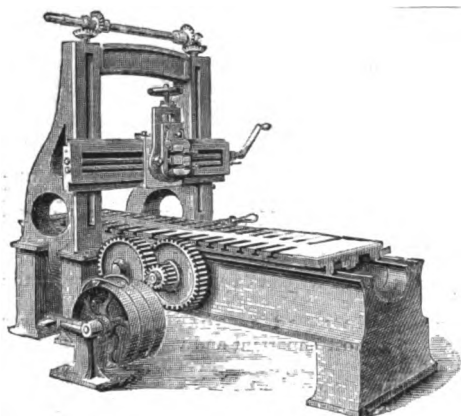
FOR RIVETING-UP BRIDGES, GIRDERS, SHIPS' FRAMES, KEELSONS, BOILER-FLUE RINGS
AND ENDS, GUN CARRIAGES, &c., &c.



These Machines can close 300 rivets, $\frac{3}{4}$ -inch diameter, per hour, and are especially adapted for all straight work, such as girders, ships' frames, &c., or any work where great depth of gap is not required. They are all fitted as punching machines also, and when the levers are removed they make very powerful machines for this purpose. They are made to do the above work at 1500 lb. per square inch; they will, however, do very good work at 700 lb., using a size larger. The levers can be had of any proportions required. These machines are also made stationary up to any power, and a very compact arrangement on a wall bracket is designed for riveting Boiler-Flue Rings. Special copper pipes are supplied at 2s. per foot, and hydraulic couplings at 20s. each.

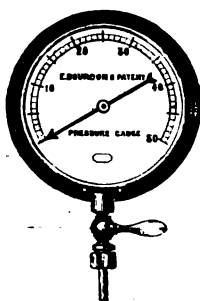
PRICES.

Class A closes $\frac{3}{4}$ -in. rivets 6 in. from edge of plate, and $\frac{1}{2}$ -in. rivets 13 in. from edge of plate	£115
„ B „ 1 „ „ 8 „ „ and $\frac{3}{4}$ „ „ 17 „ „	145
„ C „ 1 $\frac{1}{4}$ „ „ 13 „ „ and $\frac{3}{4}$ „ „ 26 „ „	165

**SELF-ACTING PLANING MACHINES.**

No.	Will Plane in Length.	Will Plane in Width.	Will Plane in Depth.	Price.
	ft. in.	ft. in.	ft. in.	£ s. d.
3	4 0	2 0	2 0	86 5 0
4	6 0	3 0	2 6	138 0 0
5	8 0	3 0	2 6	155 0 0
6	10 0	4 0	3 6	287 10 0
7	12 0	4 6	3 8	322 0 0

Specifications given for other Sizes.

BOURDON'S OWN PATENT PRESSURE AND VACUUM GAUGES.

No. 2.—Pressure Gauge, in Oblong Case of Japanned Iron, with Enamelled Dial, to indicate up to 250 lb. upon the square inch, with connecting screw joint	£1 12 6
No. 3. Do. 7 inches diameter, with eccentric hand to indicate up to 250 lb. upon the square inch	2 5 0
No. 4. Do. 7 inches diameter, with central hand to indicate up to 250 lb. upon the square inch	2 10 0
No. 7. Do. 4 inches diameter, with eccentric hand to indicate up to 250 lb. upon the square inch	1 11 3
No. 7*. Do. 4 inches diameter, with central hand to indicate up to 250 lb. upon the square inch	1 13 6
No. 8. Do. 5 inches diameter, with eccentric hand to indicate up to 250 lb. upon the square inch	1 15 0
No. 8*. Do. 5 inches diameter, with central hand to indicate up to 250 lb. upon the square inch	1 17 6
No. 9.—Vacuum Gauge, 5 inches diameter, with central hand	2 7 6
No. 10. Do. 7 do. do.	2 12 6

The above are in round Cases of Polished Brass, and fitted with Gun-Metal Cocks.

Subject to Discount.

ALEXANDER ANDERSON,

OFFICE: 9, LONDON STREET. WAREHOUSE: VINE STREET, MINORIES, LONDON, E.C.

NEW PATTERN SMITHS' BELLOWS,

With Patent Reversible Pipe.

16 inch ..	£1 8 0	30 inch ..	£4 12 0
18 „ ..	1 12 0	32 „ ..	5 10 0
20 „ ..	1 18 0	34 „ ..	6 17 0
22 „ ..	2 6 0	36 „ ..	8 16 0
24 „ ..	2 14 0	38 „ ..	11 0 0
26 „ ..	3 5 0	40 „ ..	13 16 0
28 „ ..	3 16 0	42 „ ..	16 10 0

Ordinary Smiths' Bellows same price as above.

Packing for Export, 2s. to 3s. per pair extra.

ADVANTAGES OVER ORDINARY BELLOWS.

By reversing or inserting the pipe in the Bellows, and placing the Gudgeons (or slide irons) and Lifting Hook in the pipe, they contain less than one-half the usual shipping measurement.

The arrangement of this pipe is most simple and effective, as it does not affect the internal arrangement of the Bellows, which are not liable to damage during exportation, as the Pipe, Gudgeons, and Lifting Hook cannot come in contact with the leather.



CIRCULAR RIVET FORGE.

16-in Circular Bellows ..	£4 12 0
18 „ „ ..	5 0 0
20 „ „ ..	5 16 0
22 „ „ ..	6 15 0
24 „ „ ..	7 18 0
26 „ „ ..	10 0 0

Packing for Export extra.



IRON-CASED PORTABLE FORGE.

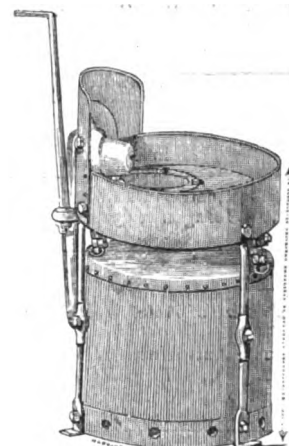
FOR RIVETING PURPOSES.

This Forge is specially suited to general out-door purposes, and will be found suitable to exposure in any climate. The iron casing is constructed especially to protect the Bellows, and the syphon and valve arrangement of the blast pipe, &c., is such as to prevent any deposit or gases entering, thereby avoiding explosion, which is so common with the ordinary Forge.

Diameter, 22 in. Height, 32 in.

22 in. wide × 32 in., Round Shaped ..	£5 15 0
24 „ „ 30 „ Square „ ..	8 15 6
27 „ „ 32 „ „ „ ..	10 5 0
30 „ „ 34 „ „ „ ..	11 15 0

Packing for Export extra.



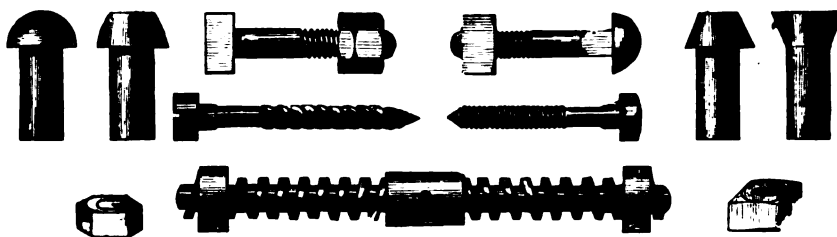
ALEXANDER ANDERSON,

OFFICE: 9, LONDON STREET. WAREHOUSE: VINE STREET, MINORIES, LONDON, E.C.

Fairbairn's Patent Rolled Wood and Coach Screws and Bolts.

The threads of these Screws are rolled on bolts or spikes by patent machinery, and are clearly a great deal stronger than the ordinary cut threads, which are made by cutting away the strongest portion of the fibres of the iron.

The disproportion which exists in ordinary cut Screws between the strength of the screwed and unscrewed portions of



the bolts is, by means of this process of manufacturing them, quite removed, for by raising the thread above the size of the neck (as shown in the figures), we obtain a better distribution of the iron for strength and lightness; thus the bottom of the threads, or groove between the threads, is only

half the depth of the thread below the body or neck of the bolt, while the top of the thread is raised the same distance above it. There are also more bolts of any size in a given weight than if made by any other process.

By rolling the thread on the bolt, or spike, the iron is improved and refined, and as there is no waste of material the manufacturers are thereby enabled to offer screwed Spikes, Bolts, or Wood Screws, at prices very little above the ordinary dog-head spikes or fang bolts, on all sizes, from half an inch and upwards. Screws of any pitch, shape of thread, or diameter, are made at very short notice. The advantages of these Screws are—

Greater Holding Power, Durability, Strength, and Lightness.

There are more in a Ton of any given size.

There is very little more Labour, if any, in using them as Spikes, and less if used as Fang Bolts.

WOOD AND COACH SCREWS, SQUARE HEADS.

Length from under head to point.	$\frac{3}{8}$	$\frac{7}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1 inch.	
6½ in. and upwards	34/	32/	30/	25/	25/	24/	24/	cwt.
4½ to 6 in. long ..	36/	34/	32/	27/	26/	26/	26/	"
3½ to 4½ in. ,, ..	39/	36/	33/	29/	28/	28/	28/	"
2 to 3 in. ,, ..			36/	30/	30/	30/	30/	"
Under 2 in. ,, ..								"
If with Hexagon Heads, 1/0 per cwt. extra.								

½ in. diameter under 2 in. long, 5/0 per gross.

Advancing 1/0 per in. per gross for every in. or fraction of an in.

¾ in. diam. under 2 in. long, 7/6 per gro.; 2 to 3 in. 9/6 per gro.
1½ " " 2 " 10/0 " 2 " 3 " 11/0 "

ENGINEERS' BOLTS (Best Quality), SQUARE HEADS AND NUTS AND ROUND NECKS.

Length from under head to points.	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1"	1½"	
6 in. and upwards	30/	26/	24/	22/	22/	22/	22/	
4½ to 6 in. long ..	32/	28/	26/	24/	24/	25/	26/	
3½ to 4½ in. ,, ..	34/	30/	28/	26/	26/	27/	28/	
2 to 3 in. ,, ..		32/	30/	29/	29/	30/	31/	
If with Square Necks, 1/0 extra per cwt. If with Hexagon Nuts, 2/6 extra per cwt.								

¼ in. diameter under 2 in. long, 6/0 per gross.

Advancing 1/0 per in. per gross for every in. or fraction of an in.

¾ in. diam. under 2 in. long, 7/0 per gross; 2 to 3 in. 8/6 per gross.
1½ " " 2 " 7/6 " 2 " 3 " 10/0 "

If with Hexagon Nuts, 1/0 per gross extra.

BOLT ENDS (per cwt.).

inch	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	1½	1½	1½	1½
With Square Nuts	28/	25/	21/	20/	18/	17/	17/	18/	19/	20/
Hexagon ,,	32/	28/	23/	22/	20/	20/	20/	20/	21/	22/

MACHINE-MADE NUTS (per cwt.).

Size of Hole. inch	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	1	1½	1½	1½	1½
Square Nuts, Untap'd	27/	24/	23/	23/	24/	25/			
,, Tapped	32/	30/	29/	29/	30/	31/			
Hexagon,, Untap'd	35/	31/	28/	28/	30/	31/			
,, Tapped	43/	40/	37/	36/	36/	36/			

HAND-MADE NUTS.

Size of Hole. inch	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	1	1½	1½	1½	1½	Square Nuts.	Per Gross.	Hexagon Nuts.	Per Gross.
Square Nuts, Untap'd, cwt.	29/	28/	27/	27/	27/	33/	34/	35/	36/	½	Untapped. 1/2	Tapped. 1/6	Untapped. 2/3
,, Tapped, ,,	35/	34/	33/	33/	34/	39/	39/	40/	41/	¾	1/5	1/8	2/9
Hexagon,, Untap'd, ,,	42/	35/	33/	33/	33/	33/	34/	35/	36/	¾	2/3	2/9	3/2
,, Tapped, ,,	50/	43/	39/	39/	40/	40/	40/	41/	42/	1	2/11	3/5	4/4

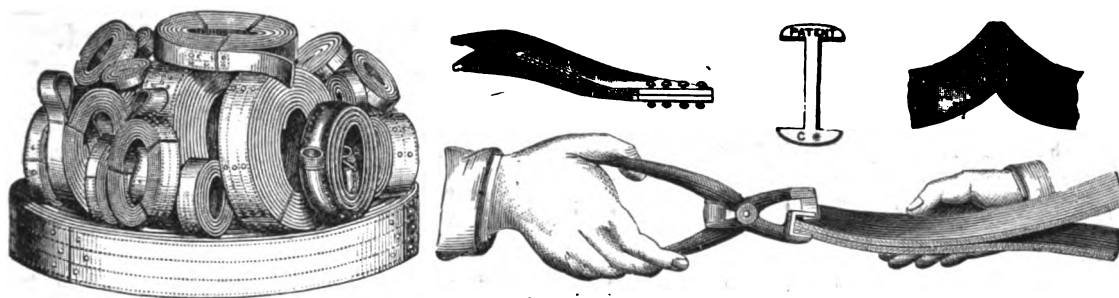
SHIP, OR GIRDER, AND BOILER RIVETS (per cwt.).

inch	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	1	1½	1½	1½	1½	1
Boiler	31/0	28/0	27/0	26/0	21/0	19/0	18/0	16/6	16/6	16/6
Ship, or Girder ..	32/0	30/0	28/0	27/0	22/0	20/0	19/0	17/3	17/3	18/0

Special quotations on receipt of Specifications.

ALEXANDER ANDERSON,

OFFICE: 9, LONDON STREET. WAREHOUSE: VINE STREET, MINORIES, LONDON, E.C.



LEATHER MACHINE-BANDS.

BEST SINGLE STRAPS.

Width.	Per foot.	s.	d.	Width.	Per foot.	s.	d.
1 inch ..	..	0	4	5 inch ..	..	2	5
1½ " ..	..	0	5½	5½ " ..	..	2	7
1¾ " ..	..	0	7	6 " ..	..	2	9
1¾ " ..	..	0	8	6½ " ..	..	3	0
2 " ..	..	0	9	7 " ..	..	3	4
2½ " ..	..	0	10	7½ " ..	..	3	8
2½ " ..	..	1	0	8 " ..	..	4	0
2¾ " ..	..	1	2	8½ " ..	..	4	4
3 " ..	..	1	3½	9 " ..	..	4	7
3½ " ..	..	1	5	9½ " ..	..	4	11
3½ " ..	..	1	6½	10 " ..	..	5	2
3¾ " ..	..	1	8	10½ " ..	..	5	6
4 " ..	..	1	10	11 " ..	..	5	9
4½ " ..	..	1	11½	11½ " ..	..	6	1
4½ " ..	..	2	1	12 " ..	..	6	6
4¾ " ..	..	2	3				

BEST DOUBLE STRAPS.

Width.	Per foot.	s.	d.	Width.	Per foot.	s.	d.
3 inch ..	..	2	7	9 inch ..	..	8	11
3½ " ..	..	2	10	9½ " ..	..	9	5
3¾ " ..	..	3	2	10 " ..	..	10	0
3¾ " ..	..	3	5	10½ " ..	..	10	10
4 " ..	..	3	7	11 " ..	..	11	6
4½ " ..	..	3	10	11½ " ..	..	12	1
4½ " ..	..	4	1	12 " ..	..	12	7
4¾ " ..	..	4	3				
5 " ..	..	4	6				
5½ " ..	..	4	10				
6 " ..	..	5	4				
6½ " ..	..	6	0				
7 " ..	..	6	6				
7½ " ..	..	7	2				
8 " ..	..	7	11				
8½ " ..	..	8	5				

BANDS FOR PORTABLE ENGINES.
At per lb.

LEATHER BELTING
In rolls not less than 200 ft.
At per lb.

WHITE OX-HIDE OR BROWN LACES.

	Per gross.	s.	d.		Per gross.	s.	d.
2 feet ..	..	6	6	4 feet ..	..	25	0
2½ " ..	..	10	0	4½ " ..	..	30	0
3 " ..	..	16	0	5 " ..	..	35	0
3½ " ..	..	20	0	6 " ..	..	53	0

HIDE ROPE,

For Ships' Rudders, and for driving Machinery, 2/9 per lb.

STRAP SCREWS.

	Per doz.	s.	d.
½ " ..	..	1	5
⅝ " ..	..	1	8
¾ " ..	..	2	0
7/8 " ..	..	2	1
1 " ..	..	2	5
1 1/8 " ..	..	2	8
1 1/4 " ..	..	2	10
1 1/2 " ..	..	3	2

GREENE'S BELT FASTENERS.

	Per 100.	s.	d.
No. 5 ..	..	3	0
" 4 ..	..	3	9
" 3 ..	..	4	0
" 2 ..	..	6	0
" 1 ..	..	8	0
" 0 ..	..	10	0

Cutters, 6/0 and 4/0 each.
Awls, 1/0.

LEATHER DELIVERY AND SUCTION HOSE.

COPPER RIVETED
DELIVERY HOSE.

Equal in strength to 3-ply
Indiarubber Hose.

	Per foot.	s.	d.
1 inch ..	..	1	5
1½ " ..	..	1	9
1¾ " ..	..	2	0
2 " ..	..	2	2
2½ " ..	..	2	4
2¾ " ..	..	2	7
3 " ..	..	3	0
3½ " ..	..	3	4
4 " ..	..	4	5

COPPER RIVETED
SUCTION HOSE.

Equal in strength to 4-ply
Indiarubber Suction Hose.

	Per foot.	s.	d.
1½ inch ..	..	3	9
1¾ " ..	..	3	11
2 " ..	..	4	1
2½ " ..	..	4	5
2¾ " ..	..	4	11
3 " ..	..	5	3
3½ " ..	..	5	9
4 " ..	..	6	5
4½ " ..	..	7	3

FLEXIBLE
SUCTION HOSE.

Bound with Copper Wire
outside.

Equal in strength to 3-ply
Indiarubber Suction Hose.

	Per foot.	s.	d.
1½ inch ..	..	3	3
1¾ " ..	..	3	4
2 " ..	..	3	5
2½ " ..	..	3	8
2¾ " ..	..	4	0
3 " ..	..	4	5
3½ " ..	..	4	9

COPPER RIVETED
SUCTION HOSE.

With Copper Spiral Wire
inside.

VERY DURABLE.

	Per foot.	s.	d.
1½ inch ..	..	5	9
1¾ " ..	..	6	5
2 " ..	..	7	0
2½ " ..	..	7	10
2¾ " ..	..	8	5
3 " ..	..	9	7
3½ " ..	..	10	6
4 " ..	..	12	5
4½ " ..	..	14	9

Copper Spiral Hooping at lower
prices.

ALEXANDER ANDERSON,

OFFICE: 9, LONDON STREET. WAREHOUSE: VINE STREET, MINORIES, LONDON, E.C.

LEATHER DELIVERY AND SUCTION HOSE—continued.

WOVEN CANVAS HOSE.

inch	3 $\frac{1}{2}$ d. per foot.
1	4d. "
1 $\frac{1}{2}$	5d. "
1 $\frac{3}{4}$	6d. "
2	7d. "
2 $\frac{1}{2}$	9d. "
3	10d. "
3 $\frac{1}{2}$	11d. "
4	1/0 "
4 $\frac{1}{2}$	1/1 "
5	1/2 "

Large Sizes up to 10 inch made
to order.

*This Hose can be Burnetized at
3d. per yard extra.*

COTTON CANVAS AND INDIARUBBER BANDS.

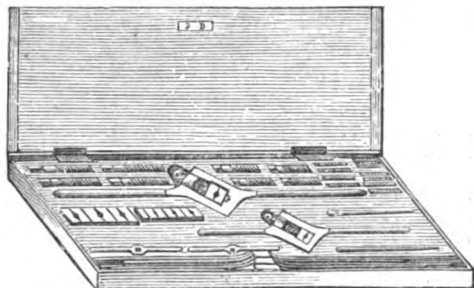
Width in inches.	2-ply. s. d.	3-ply. s. d.	4-ply. s. d.	5-ply. s. d.	6-ply. s. d.
1	0 5	0 6	0 7 $\frac{1}{2}$	0 0	0 0
1 $\frac{1}{2}$	0 7	0 9	0 10 $\frac{1}{2}$	0 0	0 0
2	0 9	0 11 $\frac{1}{2}$	1 2	1 4	1 6 $\frac{1}{2}$
2 $\frac{1}{2}$	0 11	1 2	1 5	1 8	1 11
3	1 1	1 4 $\frac{1}{2}$	1 8	2 0	2 3 $\frac{1}{2}$
3 $\frac{1}{2}$	1 3	1 7	1 11	2 3 $\frac{1}{2}$	2 8
4	1 5	1 9 $\frac{1}{2}$	2 2 $\frac{1}{2}$	2 7 $\frac{1}{2}$	3 0
4 $\frac{1}{2}$	1 7	2 0	2 5 $\frac{1}{2}$	2 11	3 4 $\frac{1}{2}$
5	1 9	2 2 $\frac{1}{2}$	2 8 $\frac{1}{2}$	3 3	3 9
5 $\frac{1}{2}$	1 11	2 5	3 0	3 6 $\frac{1}{2}$	4 1
6	2 1	2 8	3 3	3 10 $\frac{1}{2}$	4 5 $\frac{1}{2}$
6 $\frac{1}{2}$	2 3	2 10 $\frac{1}{2}$	3 6	4 2	4 10
7	2 5	3 1	3 9 $\frac{1}{2}$	4 6	5 3
8	2 9	3 6	4 3 $\frac{1}{2}$	5 2	6 0
9	3 1	3 11	4 10	5 10	6 9
10	3 5	4 4	5 5	6 6	7 6
11	3 9	4 9	6 0	7 2	8 3
12	4 1	5 2 $\frac{1}{2}$	6 7	7 10	9 0

SUBJECT TO DISCOUNT.

BEST SCREW STOCKS AND DIES FOR ENGINEERS,

IN POLISHED CASES.

Complete with Taper and Plug Taps to each Size,
and Tap Wrenches.



To Screw, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, and $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1 inch ..	£7 0 0
„ $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, and $\frac{7}{8}$, 1, 1 $\frac{1}{8}$, 1 $\frac{1}{2}$..	9 0 0
„ $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, and $\frac{5}{8}$, 1, 1 $\frac{1}{8}$, 1 $\frac{1}{2}$..	8 0 0
„ $\frac{1}{8}$, $\frac{1}{4}$, and $\frac{3}{8}$, $\frac{1}{2}$, 1, and 1 $\frac{1}{8}$, 1 $\frac{1}{2}$, 1 $\frac{3}{4}$, 1 $\frac{7}{8}$..	13 0 0
„ $\frac{1}{8}$, $\frac{1}{4}$, and $\frac{3}{8}$, $\frac{1}{2}$, 1, and 1 $\frac{1}{8}$, 1 $\frac{1}{2}$, 1 $\frac{3}{4}$, 1 $\frac{7}{8}$, and 1 $\frac{3}{8}$, 1 $\frac{5}{8}$, 1 $\frac{7}{8}$, 2 ..	24 5 0

(This set can be had in one or two cases.)

PRICE OF WORKING TAPS, MASTER TAPS, MACHINE TAPS, AND SCREW TOOLS

ADDED TO THE ABOVE CASES WHEN ORDERED, EXTRA.

	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{2}$			
Extra Working Taps, each	2/-	2/6	2/6	3/-	3/6	4/-	5/-	6/-	7/-	8/-	9/6	11/-	12/6	15/-
" Master	2/6	3/-	3/-	3/6	4/3	5/-	6/-	7/-	8/-	10/-	12/-	14/-	16/-	19/-
Machine Taps, each														
Screw Tools, per pair			4/-			4/6			5/-				7/6	

	$1\frac{3}{8}$	$1\frac{1}{4}$	$1\frac{1}{8}$	2	$2\frac{1}{8}$	$2\frac{1}{4}$	$2\frac{3}{8}$	$2\frac{1}{2}$	$2\frac{5}{8}$	$2\frac{3}{4}$	$2\frac{7}{8}$	3 in.
Extra Working Taps, each	17/-	19/-	22/-	26/-	30/-	34/-	38/-	43/-	50/-	55/-	62/-	70/-
" Master	22/-	24/-	27/-	32/-	36/-	40/-	45/-	50/-	60/-	65/-	72/-	82/-
Machine Taps, each												
Screw Tools, per pair				7/6			8/6				9/6	



LONDON, 1862.

SOLE AGENTS FOR COOD'S PATENT
GLOBE STOPPERED S.W. BOTTLE.

VIENNA, 1873.



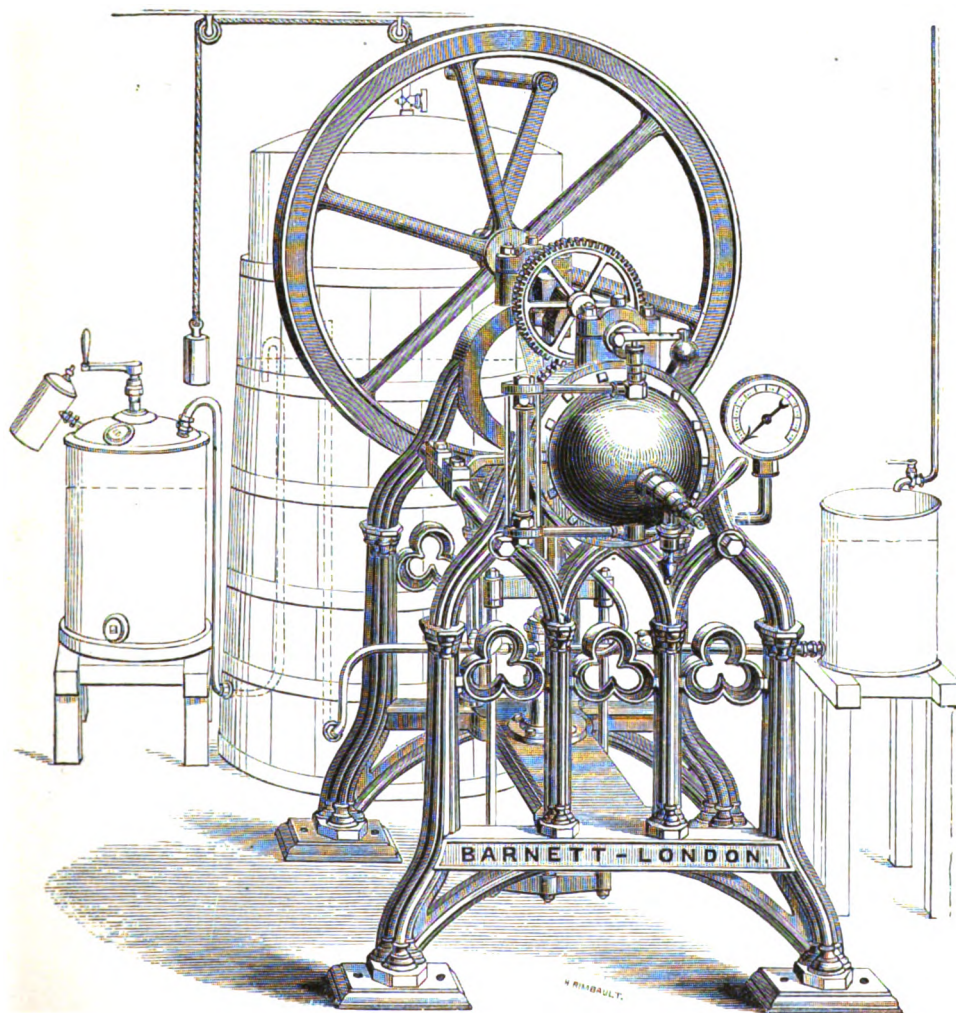
LONDON, 1873 & '74.

SODA-WATER MACHINERY.

These Machines manufacture the following and other Fancy Drinks: SODA WATER, POTASS, SELTZER, CARRARA, LITHIA, MAGNESIA, TONIC, and SEIDLITZ WATERS.

LEMONADE, GINGER BEER, GINGER ALE, GINGERADE, ORANGEADE, NECTAR, CHAMPAGNE CIDER, RASPBERRYADE, &c., &c.

FIG. D.



BARNETT, SON, AND FOSTER,

23, FORSTON STREET, LONDON, N.

FIG. E.

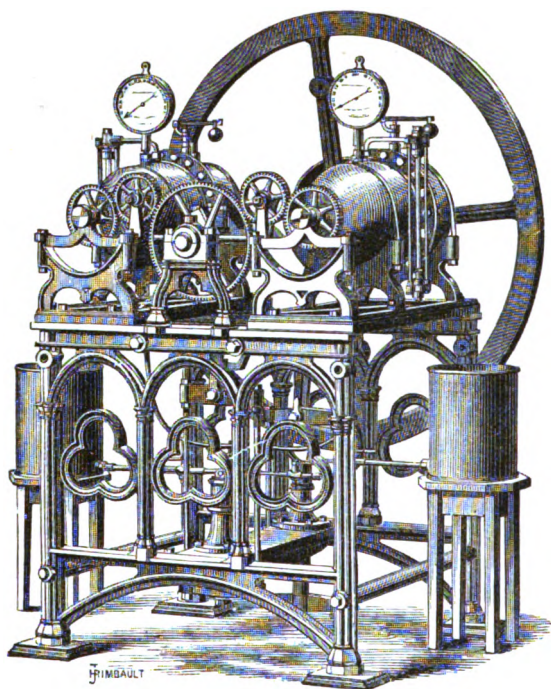


FIG. F.

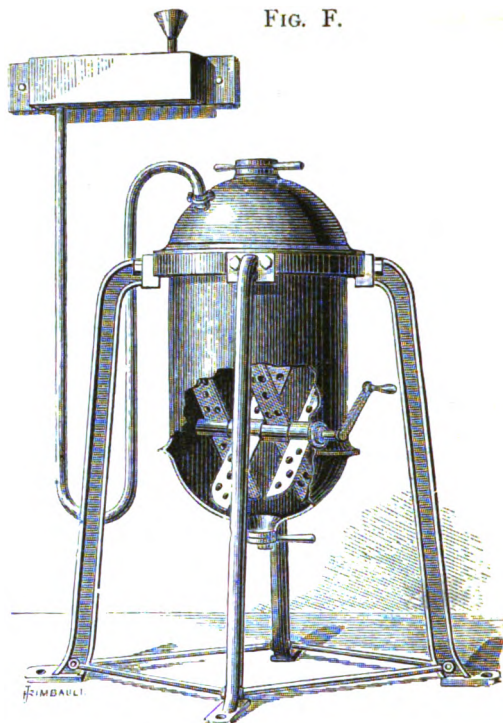
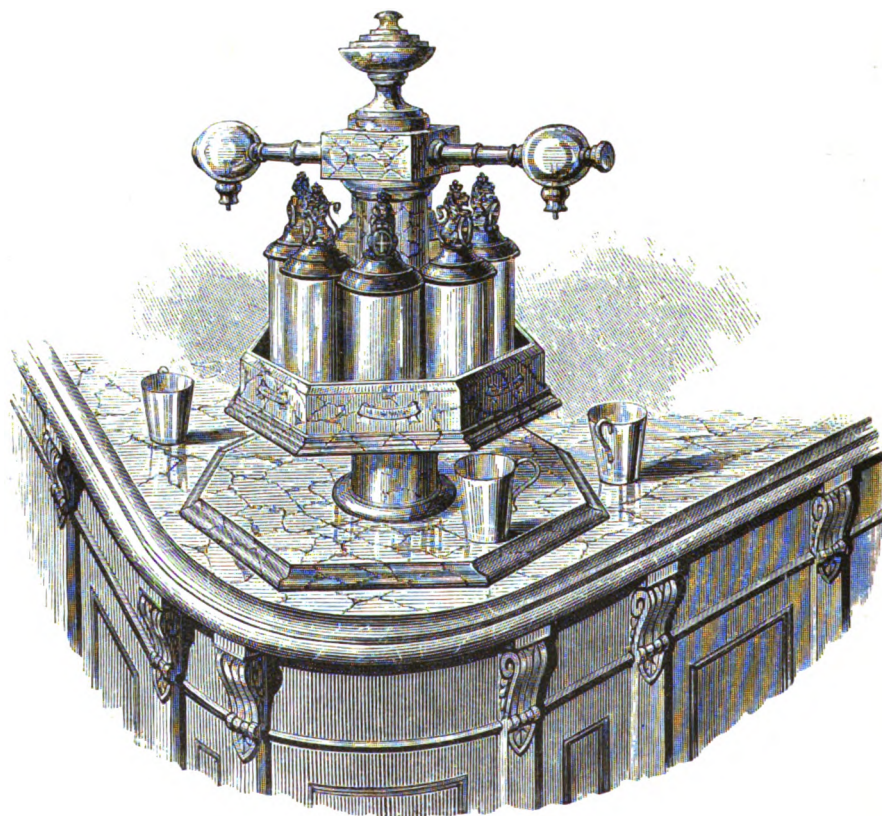


FIG. G.



BARNETT, SON, AND FOSTER,
23, FORSTON STREET, LONDON, N.

Directions for Ordering a Soda-Water Machine and Accessories.

The following may be taken as a Guide in ordering for a complete Factory :

FOR A FACTORY USING CORK BOTTLES AND THE "LONDON-MADE" SYPHONS.

Direct-Action Soda-Water Machine, Fig. D.	
Say size, and if fitted with Water Gauge.	
Patent Dial Pressure-Indicator.	} These are the same for any size Machine.
Filling and Corking Apparatus.	
Say if fitted with Syrup Pump.	
Wiring Stand.	
Registered Syrup Tap.	
Bottle-Washing Machine.	} FOR PRICES, SEE NEXT PAGE.
Syphon Filling Apparatus.	
„ Syruping „	

FOR A FACTORY USING EXCLUSIVELY CODD'S PATENT GLOBE-STOPPERED BOTTLES.

Direct-Action Soda-Water Machine.	
Say size, and if fitted with Water Gauge.	
Patent Dial Pressure-Indicator.	} These are the same for any size Machine.
Codd's Patent Bottles.....gross.	
Codd's Patent Filling Machine (if fitted with Syrup Pump).	
Bottle-Washing Machine (if required).	
Registered Syrup Tap (this is not required if Syrup Pump is ordered).	

Either of the above lists comprises all that is required for Home use, but if for Abroad, it is advisable to have extra sets of leathers, and a few parts liable to wear, in duplicate, to both the Machine and Bottler, to the amount of £5 for the smallest, and rising £1 in addition for each size larger, these being so very desirable when at a distance from the manufactory.

It will be seen by looking over the prices for the above, that a small outlay will suffice to set up a complete Factory, work it at a trifling cost, and, by supplying the public with a superior article, to easily establish a very profitable trade. In any neighbourhood where there is not a Machine for a few miles round, it is the best investment known for a small outlay—bearing in mind that there is *no previous knowledge of the business required*—and will remain so for many years, as the taste for Aërated Drinks is much on the increase, and the mere cost of carriage from a distance is often more than the cost of the Drinks when made on the spot.

BARNETT, SON, AND FOSTER,

23, FORSTON STREET, LONDON, N.

SODA-WATER MACHINERY.

Soda-Water Machine (Fig. E), with large and Improved Gas-work (Generator, Fig. F.)

complete, to produce 12,000 to 14,000 bottles per day	£200	0	0
Ditto, ditto, to produce 9000 to 10,000 bottles per day	180	0	0
No. 1 Machine (Fig. D) makes 350 doz. bottles of highly-charged Aërated Waters a day	70	0	0
„ 2 „ „ 250 „ „ „ „	65	0	0
„ 3 „ „ 200 „ „ „ „	60	0	0
„ 4 „ „ 150 „ „ „ „	55	0	0
„ 5 „ „ 100 „ „ „ „	50	0	0

The above Machines are all of the *same design*, the difference being *only in size*.

The Water Gauge and Dial Indicator are Extra.

We supply these to established Manufacturers, separate from Gas-work, at following Prices :

No. 1, £55; No. 2, £50; No. 3, £45; No. 4, £40; No. 5, £35.

Hotel Keepers' and Chemists' Soda-Water Machine, to produce 30 doz. a day	£30	0	0
Bottling Apparatus, complete	9	9	0
Dial Pressure-Indicator	4	10	0
Water Gauge	3	3	0
Bottle-Washing Apparatus, for Manual or Steam Power	from £3 to	8	0
Brushes for ditto, 10s. to 14s. a gross.			
Wiring Stand	4	10	0
Syrup Measuring Tap	0	16	0
The Improved Generators, as Fig. F, 26 gallons, £25; 36 gallons	30	0	0
Sulphuric Acid Tap	2	12	6
Filters, £5, £10, and £14, to yield 4, 8, or 12 gallons a minute.			
Syphon Filling Machine	6	10	0

Quart Size "London-made" Syphons, a doz. 33s.; or 100, £15.

Pint Size „ „ „ 28s.; „ £13.

Packing Cases, containing 100 Quarts each, sizes, 3 ft. 10 in. by 2 ft. 5 in. by 2 ft. 2 in., for export.

„ „ „ Pints „ „ 3 ft. 2 in. by 2 ft. 1 in. by 1 ft. 11 in. „

Improved Horizontal and Vertical Steam Engines, Shafting, Steam Pans, &c., &c; see Catalogue, forwarded free to any part of the world.

BARNETT, SON, AND FOSTER,

23, FORSTON STREET, LONDON, N.

MARBLE PILLAR FOUNTAIN AND GALLERY, FOR SYRUP CANS.

(FIG. G.)

The Drawing represents a handsome Combination Fountain for dispensing Soda Water and Syrups.

In the centre of the Pillar is bored a hole, through which passes a block-tin Pipe for conveying the Soda Water from the Cylinder under the counter to the Draught Tubes. The Draught Tubes are of novel and perfect construction; cleanliness is secured, as they are composed of glass, the metal connections being thickly coated with silver. They are so made, that a small but quick draught can be drawn so as to thoroughly mix the Syrup, and after, a larger draught, or for serving plain Soda Water, as more gas is retained when drawn from a large orifice. The general construction of these Draught Taps is a great improvement over any other kind yet invented, for simplicity and expedition in operating. We supply the Improved Taps to all Fountains, whether pillar or otherwise.

On each side are arranged Syrup Cans for containing the different Syrups, in a marble gallery formed for the purpose of holding pieces of broken ice, and thus cooling the Syrups at the point of outlet; in front of each can is marked the name of the Syrup, engraved on a silvered shield: under each of these galleries the goblets should be arranged ready for receiving the Syrup from the cans, which is discharged by simply raising the lion at top; the outlet valve closes itself immediately the requisite quantity is withdrawn. Each of these Syrup Cans can easily be lifted out of the gallery for cleaning, by merely unscrewing a nut at bottom.

The convenience and value of this arrangement of the Soda-Water Fountain and Syrup Cans is hardly to be fairly estimated, except by those who have had them in use. The gallery in the pillar is so made that it turns easily round, thus any Syrup may be brought immediately in front of the operator.

Price, complete, for seven Cans, £30.

Sicilian Marble Pillar Fountains, of different designs from £20 to	£80	0	0
Mahogany Pillar Fountains.. .. .	7	7	0
Copper Cylinders for Counter Fountains, the inside coated with tin, complete with connections at top, pipe inside to bottom, and loose trough for holding ice—			
For six gallons	8	10	0
For eight gallons.. .. .	10	10	0
For ten gallons	12	10	0
For twelve gallons	15	0	0

BARNETT, SON, AND FOSTER,

23, FORSTON STREET, LONDON, N.

CODD'S PATENT GLOBE-STOPPERED SODA-WATER BOTTLE

OBTAINED THE ONLY MEDAL AWARDED FOR BOTTLES AT THE VIENNA AND LONDON
EXHIBITIONS, 1873.



Protected by Four Patents in the United Kingdom, and Patented in many parts of the world.

THE ADVANTAGES

When compared with the ordinary cork bottle, may be enumerated as follows :

1. *There is no after expense.* Once having expended, say, £100 in the Patent Bottles, all after is profit, as neither wiring, stringing, or skilled labour is required in filling, and thus the expense of corks, wires, and string is dispensed with ; while to the public, or consumer, the advantage is proportionate, as a child can open them.
2. *No corks used ; stopper is everlasting, and never requires renewal.*
3. *No wire or string required.*
4. *No skilled labour required.* A boy or girl of fifteen or sixteen can fill, after an hour's practice, many more bottles during the day than an experienced bottler can by the old system, and with much less fatigue.
5. *Very much less labour in the factory.* Tyers, wirers, and fitters are entirely dispensed with ; and the bottle having to pass through fewer hands, there is less labour required in carrying about and shifting crates, and this more so since we now dispense with the separate operation of syringing. For the same reason there is less breakage ; there is also less breakage in charging the bottles, from the simple mode of filling, and from there being no cork to force into the bottle.

SOLE AGENTS:

BARNETT, SON, AND FOSTER,
23, FORSTON STREET, LONDON, N.

SODA-WATER BOTTLE—continued.

6. In the height of the season, when there is a great demand for goods, if a spare filling machine is kept, no overtime need be worked, or extra pay given to the operators ; the extra machine can be at once put to work to meet the demand, and, as before stated, the boys or girls employed only require an hour's practice to do as much as experienced hands. Thus the employer is independent of his employés, and their irregularities can be checked, which in the busy season is a great advantage.

For export, or where it is preferred to have a large stock of Aërated Drinks always ready, these bottles are invaluable, as there are no wires to become rusty, neither does the strength evaporate by long keeping, which in lemonade and saccharine drinks is a great source of evil, the sugar and strength percolating through the cork, making it sticky, dirty, and disagreeable, besides the loss of strength if kept long. In these Patent Bottles, the greater the pressure the liquid is bottled at, the less chance is there of leakage occurring. They are also perfectly protected from the attacks of rats and other vermin on shipboard, which generally cause considerable loss by gnawing the corks and string of bottles containing lemonade and other sweet beverages.

The following Prices are for the United Kingdom, where an Annual Royalty is charged ; but as it is difficult to make arrangements for the payment of a similar rental in many Foreign Countries, two guineas extra is added to the price of the Filling Machine, one guinea on the Syrup Pump, and a higher charge is made for the Bottles :

HOME PRICES, subject to fluctuation. Bottles are Carriage Paid.

		£	s.	d.
Bottles, Soda Water	a gross	2	2	0
„ flat bottom (Lemon)	„	2	0	0
„ Seltzer	„	2	1	0
„ Cylindrical, but with flat bottoms (does for any drink) ..	„	2	0	0
„ extra large, or Indian size	extra a gross	0	6	0
Filling Machine	each	15	15	0
Patent Treadle Syrup Pump, with metal barrel	„	6	6	0
„ „ with glass barrel	„	7	16	0
Copper Pan, thickly lined with tin, and fitted with draw-off cock, for holding Syrup	„	1	5	0
Lever Openers	a dozen	0	18	0
Button Openers	a gross	0	12	6

Where *Names* are required on the Bottles, the moulds are in all cases charged £2 10s. each ; the Engraving of Name, 4d. each letter ; Trade Mark, or any device, according to amount of work, averaging from 2s. to 20s.

SOLE AGENTS:

BARNETT, SON, AND FOSTER,

23, FORSTON STREET, LONDON, N.

2 E

DIVING APPARATUS.

CONTAINING EVERY RECENT IMPROVEMENT.

AS SUPPLIED TO THE ROYAL NAVY AND THE VARIOUS MARITIME POWERS.

BARNETT, SON & FOSTER,



FORSTON STREET, LONDON, N.



BARNETT, SON & FOSTER,



FORSTON STREET, LONDON, N.

APPARATUS FOR USE IN GREAT DEPTHS.

These Machines can be worked by any labouring man after once reading the Book of Directions sent with the Apparatus.

A Treble-Barrel Atmospheric Air Engine, with large size gun-metal barrels, 2 fly wheels and handles, forged iron crank, condensing chamber, copper cooling cistern, dial indicator, six wrenches fitted to all the parts: the whole mounted in Mahogany Chest, with protecting ends for security and ease in removal.

A Till fixed in the above, containing 3 extra plain gun-metal joints for mending tube, 1 extra union same as on tube, 2 extra crank-end nuts, 4 extra helmet nuts, 3 extra sets of bucket leathers, extra valve springs, washers, spanners, screw-driver, oil can, and a double circle steel washer-punch, &c.

A round Wicker Box, containing the tinned copper helmet, with segment screw-joint, as described; 2 lead weights, with gun-metal mountings; helmet cushion; and 100 feet of vulcanized indiarubber tube, with gun-metal unions on, in leather caps.

A Seaman's Chest, of Mahogany, dovetailed together and fitted with patent hinges and lock, and containing—

- 2 Waterproof tanned twill Diving Dresses, with vulcanized collars and cuffs.
- 1 pair strong Leather Boots, with Lead or Iron Soles.
- 4 pairs of thick Worsted Stockings.
- 2 pairs of ditto, larger size.
- 4 pairs of thick Woollen Drawers.
- 6 White Guernsey Frocks.
- 1 Suit of Stout Canvas, for wearing over Diving Dress, for preserving same, consisting of Trousers and Jacket.
- 2 thick Neckerchiefs.

- 2 Red Woollen Caps.
- 12 Wrist Rings.
- 1 pair of Wristbands.
- 30 fathoms of Signal Line.
- 30 fathoms of Ladder Line.
- 1 can of Indiarubber Solution, for repairing dress and tube.
- 1 yard of Prepared Canvas, for repairing dress and tube.
- 1 Diver's Knife in Sheath.
- 1 Shot Belt, for weighting Diver.

THE WHOLE OF THE ABOVE COMPLETE, £140.

Packing above for export, in extra strong cases, iron bound, £3.

Sizes and weights as under :

	Size.	cwt.	qrs.	lb.
Containing Air Engine, &c.	3 ft. 6 in. by 2 ft. 9 in. by 2 ft. 3 in. . .	4	3	12
„ Dresses, &c.	2 „ 7 „ 1 „ 8 „ 1 „ 5 „ . .	1	0	0
„ Helmet, Tube, &c.	3 „ 4 „ 3 „ 4 „ 2 „ 9 „ . .	5	3	4
Total cube.	58 ft. 4 in.	Total weight. 11 cwt. 2 qrs. 16 lb.		

BARNETT, SON, AND FOSTER,

23, FORSTON STREET, LONDON, N.

DIVING APPARATUS,

FOR USE IN SHALLOW DEPTHS TO NINETY FEET.

A Single-Barrelled Atmospheric Air Engine (double action) with large size gun-metal barrel ; two fly wheels and handles ; forged iron crank ; copper condensing chamber ; copper cooling cistern ; dial indicator ; spanners for all parts ; the whole mounted in Mahogany Chest, with protecting ends, for security and ease in removal.

A Till fixed in the above, containing a few useful and duplicate parts, viz. one extra gun-metal joint for mending tube, two extra helmet nuts, extra valve springs, washers, screw-driver, oil can, &c.

A round Wicker Box, containing helmet, with two lead weights and mountings, as described ; helmet cushion, fifty feet of vulcanized indiarubber tube, with gun-metal union and ends, and protected in leather caps.

A Seaman's Chest, of Mahogany, dovetailed together, fitted with patent lock, containing :

One best tanned twill Diving Dress, with all improvements, fitted with collar and cuffs of vulcanized india-rubber.

One pair thick Leather Boots, mounted with Lead or Iron Soles, and fitted with straps and brass buckles.

Two pairs thick Worsted Stockings.

One pair ditto, larger size.

Two pairs thick Worsted Drawers.

Two pairs white thick Worsted Frocks.

One suit of stout Canvas Overalls, for wearing over Diving Dress.

One Scarf or Neckerchief.

One Woollen Cap.

Four Wrist Rings.

Fifteen fathoms of Signal Line.

Fifteen fathoms of Ladder Line.

One can of Indiarubber Solution for repairing dress and tube.

One square yard of Prepared Canvas for repairing dress and tube.

One large Clasp Knife and Sling.

One Shot Belt, for weighting Diver.

THE WHOLE OF THE ABOVE COMPLETE, £95.

Packing above for export in extra strong cases, iron bound, £2 10s.

OBSERVE.

The Apparatuses, as enumerated, are perfect in themselves, and contain every necessary requisite ; but as extra lengths of tube for greater depth are sometimes required, with such parts as are liable to wear out or get lost, we subjoin a list of those articles that may be ordered as extras, viz. :

HELMET, complete, made of stout copper, tinned and well planished, fitted with three eyes, fitted with glass made to open ; segment screw at collar, to disconnect head-piece by one-eighth of a turn ; shoulder-piece, fitted with quadrant-pieces for gripping collar of dress, fitted with screws and fly nuts ; two weights for back and front, with copper rings and shackles for attaching to helmet ; all necessary valves and connections required to make helmet complete each

£21 10 0

Helmet Shoulder-piece, with Quadrant-piece, Fly Nuts, Screws, &c., complete "

8 0 0

Helmet Glass, thick, ready for fixing in frames of helmet "

0 6 0

Helmet Eye Rings (vulcanized) "

0 1 0

Helmet Fly Nuts and Male Screws "

0 3 6

Helmet Cushion (stuffed with horsehair) "

0 7 6

Vulcanized Tubing (in 50-ft. lengths) per foot

0 2 0

Vulcanized Tubing (in 50-ft. lengths), floating "

0 2 9

Gun-Metal Union Joints, for connecting tube each

0 6 6

Plain Metal Joints, for mending tube "

0 2 0

Waterproof Double-tanned Twill Diving Dress "

5 10 0

Ditto, ditto, with improvement for Diver to urinate "

6 0 0

Prepared Canvas for repairing dresses per yard

0 8 0

Cans of Solution for repairing dresses each

0 3 6

Vulcanized Cuffs for dress per pair

0 10 0

Vulcanized Collars for dress each

1 0 0

Wrist Rings per doz.

0 4 0

Wristbands per pair

0 4 0

Boots, with Lead or Iron Soles "

2 0 0

Thirty fathoms of Ladder Line each

0 7 6

Thirty fathoms of Life Line "

0 17 6

Shot Belt (for weighting Diver) "

0 4 6

Large Dagger Knife, in Copper Sheath "

0 15 0

Gun-Metal Crank End Nuts "

0 3 0

Bucket Leathers per set of 3

0 7 6

Double Circular Steel Punch, for making leather washers each

0 7 0

Yarn Hose (Worsted Stockings) per pair

0 6 0

Outside Hose (larger ditto) "

0 7 6

Flannel Drawers "

0 7 6

White Guernsey Frocks each

0 13 0

Navy Duck Overall, of stout canvas, for wearing over Diving Dress "

0 10 0

Overall Jackets, of stout canvas, for wearing over Diving Dress "

0 10 0

Neckerchief "

0 3 0

Flannel Caps "

0 2 6

BARNETT, SON, AND FOSTER,

23, FORSTON STREET, LONDON, N.

POWERFUL AIR PUMPS,

AS SHOWN ON NEXT PAGE,

FOR USE IN BUILDING BRIDGES, HYDRAULIC DOCKS, &c., &c.

We have the highest Testimonials from those who have them in use.

A massive cast-iron frame, with top bed-plate securely bolted together at top and sides, with long stretchers at bottom ; a strong wrought-iron crank, of 5-inch round iron, turned true to fit gun-metal bearings in frame, and three gun-metal coupling brasses, the throw being 9 inches each, the ends being turned to receive a cast fly-wheel and a turned band-wheel ; three large gun-metal barrels, 9 inches diameter, and 22 inches high, with top gun-metal covers fitted with inlet and outlet valves and lubricating cups, the outlet valves being coupled together to give a continuous stream from a 2-inch pipe ; three slings and guide rods of well-forged iron, fitted to three solid gun-metal buckets, mounted with cup leathers. The total weight when finished being about three and a half tons.

PRICE £400.

Packing the above in extra strong cases, iron bound, for export, £30.

Sizes and weights of cases as under (the cost of packing can be very much modified, presuming the side frames, bed plate, and wheels were not packed in cases) :

		cwt. qrs. lb.					
Case containing three Pump Barrels, &c.	.. .. .	8	2	11	..	4 ft. 2 in. by 3 ft. 2 in. by 2 ft. 0 in.	
" " " Buckets and Slings, &c.	.. .. .	11	0	18	..	4 " 4 " 3 " 5 " 1 " 10 "	
" " Side Frame	.. .. .	10	3	10	..	5 " 2 " 4 " 4 " 1 " 2 "	
" " Ditto	.. .. .	10	3	10	..	5 " 2 " 4 " 4 " 1 " 2 "	
" " Wheel (band)	.. .. .	4	3	0	..	4 " 2 " 4 " 2 " 1 " 0 "	
" " Fly Wheel	.. .. .	8	2	25	..	5 " 2 " 5 " 2 " 1 " 0 "	
" " Top Bed-Plate	.. .. .	9	2	15	..	5 " 5 " 3 " 0 " 1 " 11 "	
" " Stretchers, Bolts, &c.	.. .. .	4	0	24	..	8 " 5 " 1 " 6 " 1 " 0 "	
" " Crank	.. .. .	5	0	23			
Total weights	.. .. .	73	3	24			

DIVING BELLS, LAMPS, CRANES, KEEL AND BOAT LADDERS, SCRAPERS, BRUSHES, AND ALL TOOLS FOR SUBMARINE WORK.

ESTIMATES GIVEN FOR ALL APPARATUS CONNECTED WITH SUBMARINE WORK.

CHEAP APPARATUS FOR INSPECTING MINES, POISONOUS WELLS, &c., &c.

SHIPS' PUMPS, FIRE ENGINES, APPARATUS FOR SUBMARINE EXPLOSIONS.

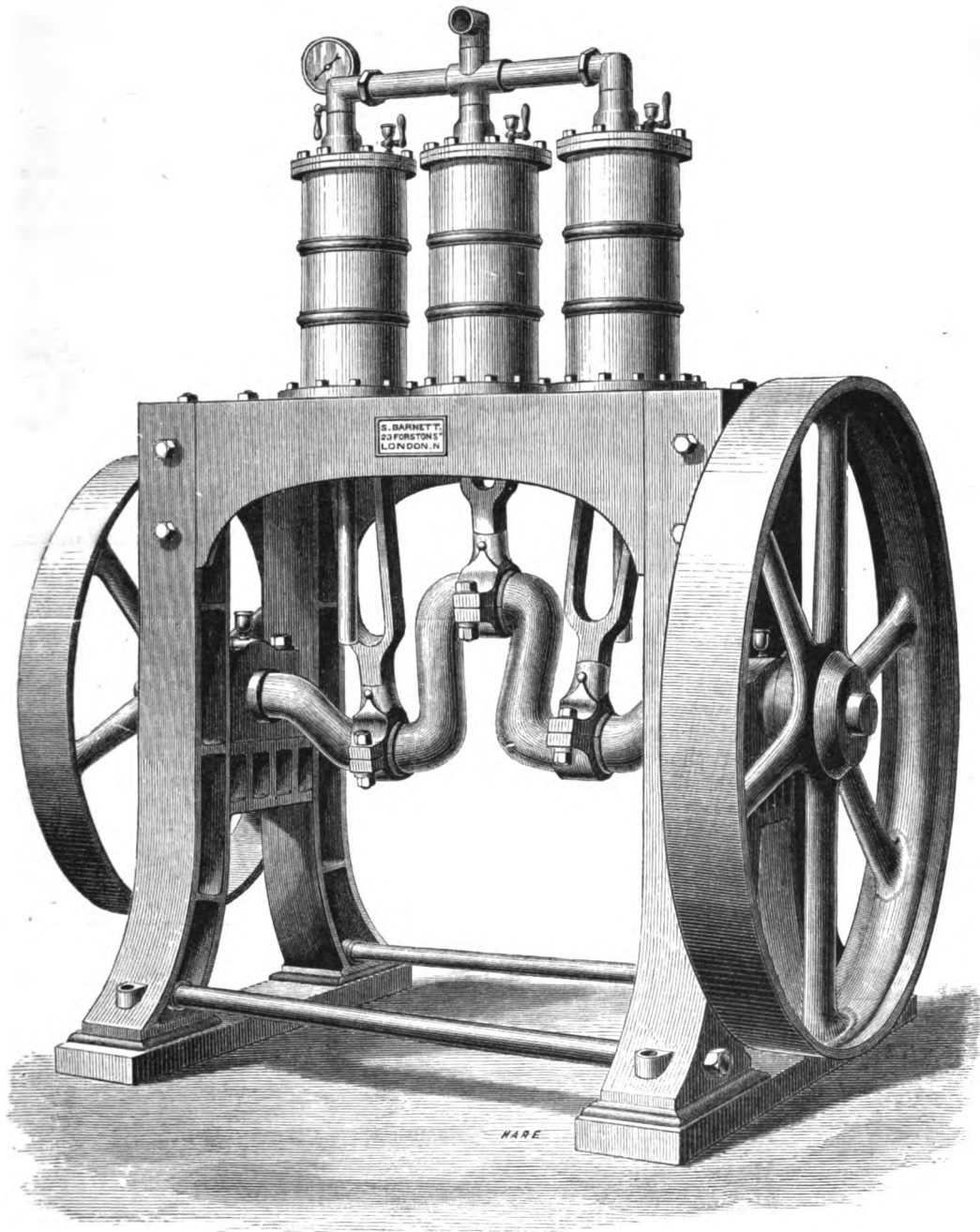
Catalogues forwarded free to any part of the world.

BARNETT, SON, AND FOSTER,

23, FORSTON STREET, LONDON, N.

POWERFUL TREBLE-BARRELLED AIR PUMP,

FOR USE WHEN LARGE VOLUME AND POWER ARE REQUIRED.

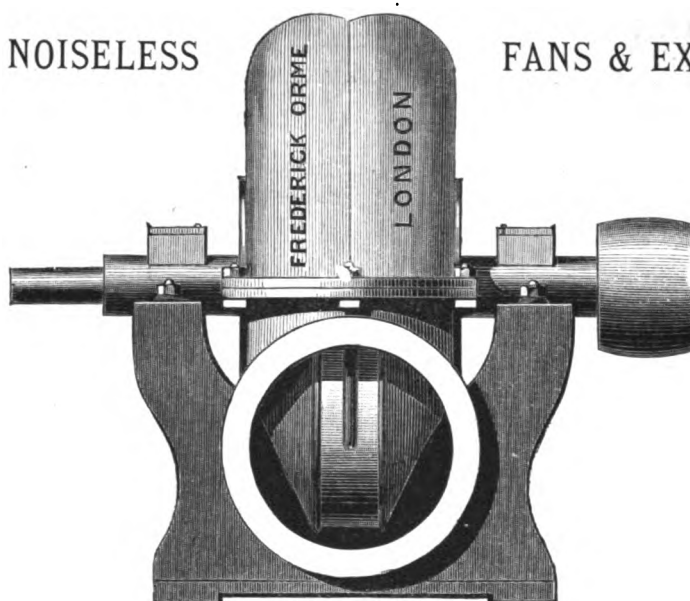


BARNETT, SON, AND FOSTER,

23, FORSTON STREET, LONDON, N.

PATENT NOISELESS

FANS & EXHAUSTERS.



These **Fans** and **Exhausters** combine every known improvement in construction, and are guaranteed from data, based on positive practical experience, to produce a **more powerful Blast**, or a more perfect vacuum, at a much less expenditure of power than that required for any other Fan Blower or Exhauster hitherto in use.

THE Leading Features in this Patent ARE:

1st. Its extreme **simplicity** of construction. 2nd. Its total **prevention** of back lash. 3rd. Its entire absence of friction or choking at the sides, when used as an Exhauster for drawing off dust or other impurities. 4th. Its **continuous** and **uninterrupted** suction from the chamber or vessel to be exhausted, unlike the ordinary Fan Blast. 5th. It gives a more perfect Blast with **less expenditure** of power than any other Fan. 6th. It is free from all **humming noise**. 7th. **No power is wasted** by undue friction. 8th. There is almost an impossibility of its being deranged, hence its consequent increased durability.

The Spindles are made of the **best Cast Steel**, running in carefully-prepared Bearings, and made long enough to drive from either side. The Discs also are made of the **best Charcoal Iron**. All the wearing parts are accurately balanced, and the whole warranted of the best material and workmanship. The tremor of the strap axis is confined to one casting, by the bearing standards being cast in one with the lower part of iron casing. The casing is also divided horizontally, as shown in the Engraving, to facilitate the operation of cleaning.

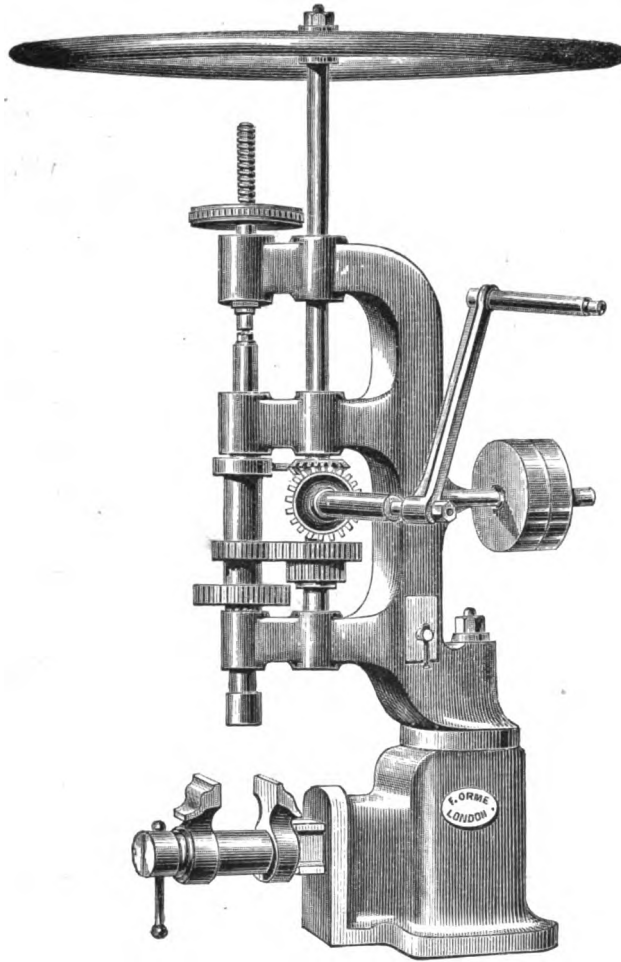
Sizes.	Prices of Blowers.			Quantity of Metal per Hour.	No. of Smithy Fires.	Diameter of Discharge.	Size of Steel Spindle.
inches.	£	s.	d.	cwt.			
10	4	0	0	..	3	4½ rd.	1
13	5	10	0	8	5	6 "	1½
16	7	10	0	15	8	7 "	1½
20	10	0	0	26	13	8 "	1½
25	18	10	0	50	20	9½ "	1½
30	23	0	0	75	30	11 sq.	2
36	30	10	0	100	48	13 "	2½
42	38	0	0	150	70	16 "	2½
48	45	0	0	200	100	22 x 18	2½

The Prices of the various sizes of Fan Exhausters may be taken from the above List of Blowers, with an addition of 25 per cent. on each.

FREDERICK ORME.

OFFICE: ETHELBURGA HOUSE, 70 AND 71, BISHOPSGATE STREET, LONDON, E.C.

DRILLING MACHINE.

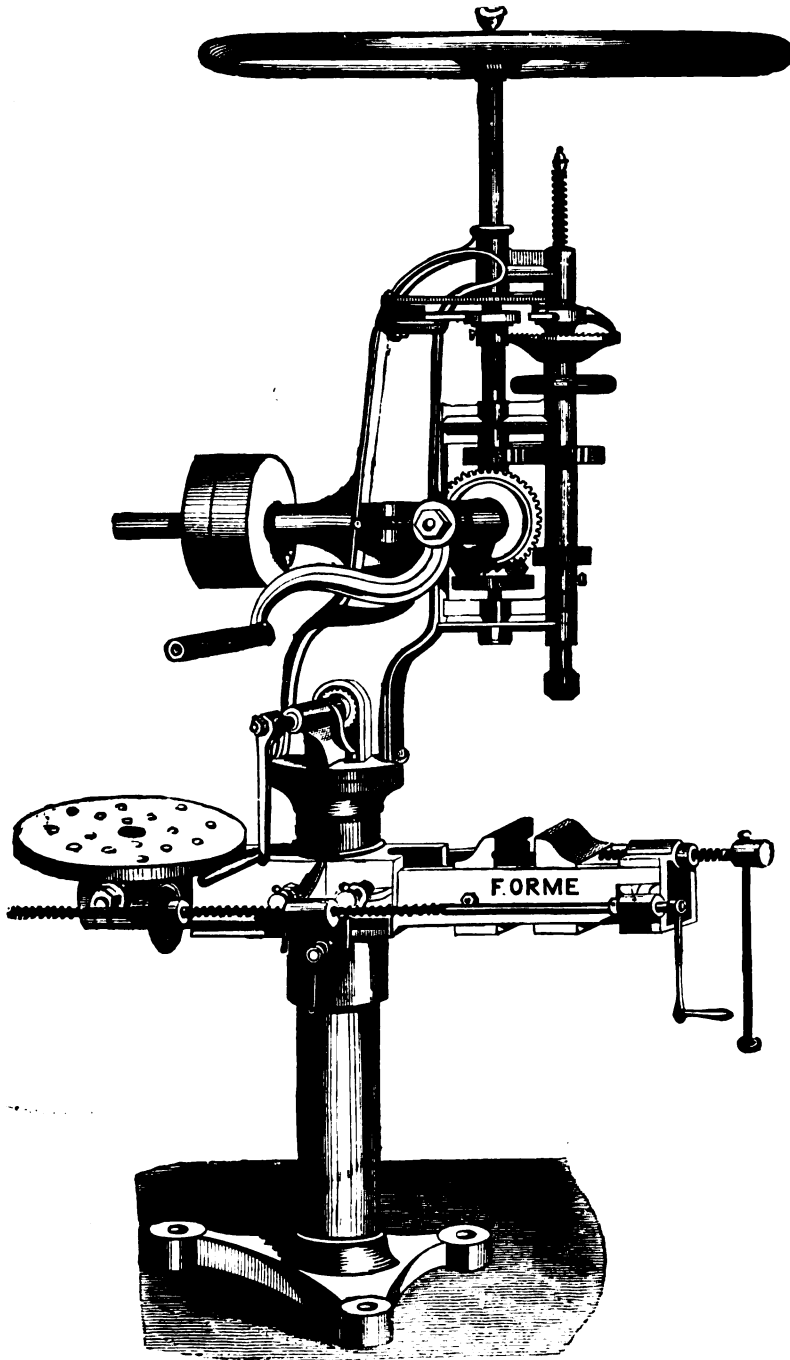


This Machine is specially adapted for Engineers' Light Work, and will be found the most useful Machine in the shop. Will drill holes up to $1\frac{1}{4}$ inch. Is fitted with fast-and-loose Pulleys, also Handle and self-acting feed motion. Will swing clear of the centre to allow of long articles being bored. Price £12.

FREDERICK ORME,

OFFICE: ETHELBURGA HOUSE, 70 AND 71, BISHOPSGATE STREET, LONDON, E.C.

PORTABLE PILLAR DRILLING MACHINE.



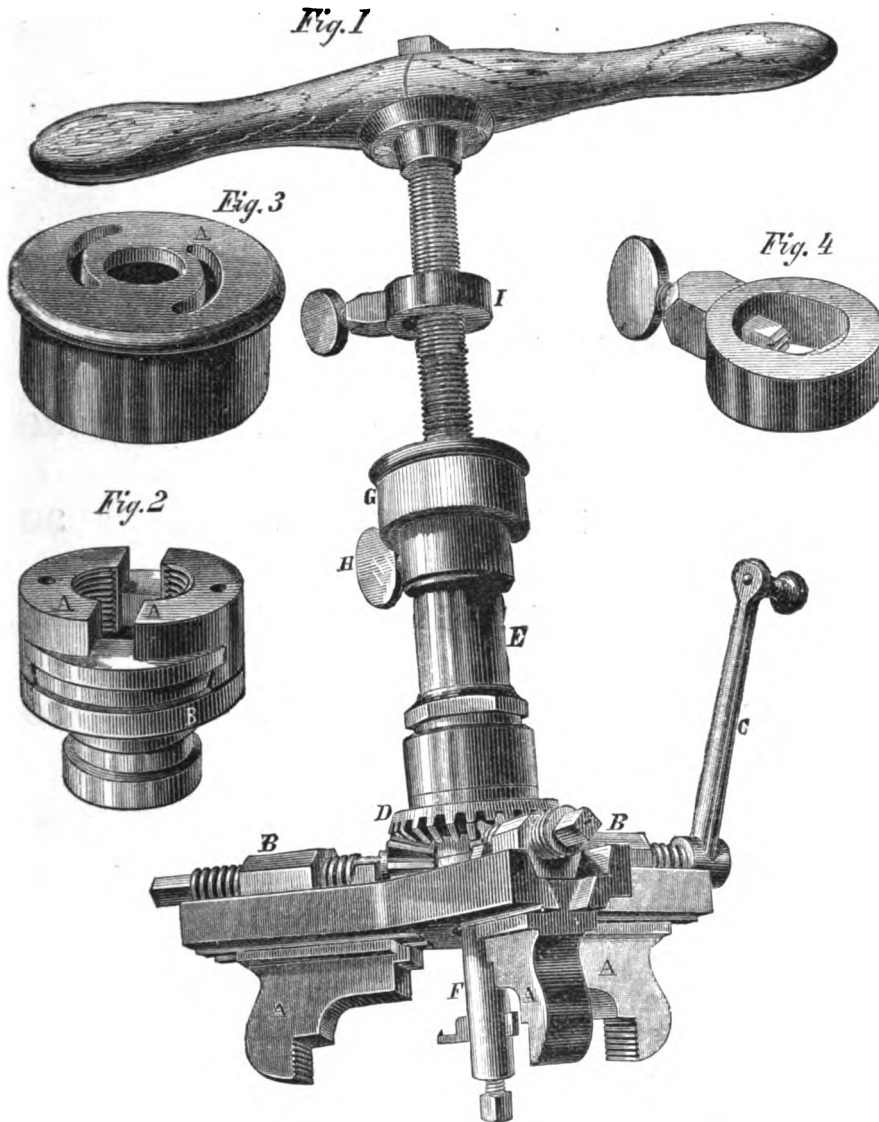
This Machine is fitted with Improved Adjustable Parallel Vice and Universal Circular Table, to rise and fall by rack and pinion, and to swing completely round on the pillar; Handle, fast-and-loose Pulleys, to turn by Hand and Steam Power. Will be found a most useful Machine for holes up to $2\frac{3}{8}$ inches diameter. Price £26.

Smaller Machines made in sizes to drill holes up to $\frac{5}{8}$ for Hand only; and up to $1\frac{3}{4}$ inches diameter, with Handle, fast-and-loose Pulleys, for Hand and Power combined. Prices, £5 to £20.

FREDERICK ORME,

OFFICE: ETHELBURGA HOUSE, 70 AND 71, BISHOPSGATE STREET, LONDON, E.C.

SELF-CENTERING WHEEL-BOXING MACHINE.



IMPORTER OF "CHASE'S" PIPE-CUTTING AND SCREWING MACHINES, $\frac{1}{8}$ to 2 inch. Price £28 0 0
 THE LIGHTENING, SCREWING, AND TAPPING MACHINES, $\frac{1}{4}$ to $\frac{3}{4}$ inch. 13 10 0
 These Machines supersede the ordinary Stocks, Taps, and Dies, and are the best Labour-Saving Machines introduced into this country.
 UNIVERSAL HAND PLANING MACHINES Price, from £10 0 0

Price, complete, £6. Large size, £7.

AMERICAN SPOKE TENONING MACHINES.

See New Illustrated Catalogue, Post-free.

FREDERICK ORME,

IMPORTER OF AMERICAN LABOUR-SAVING MACHINERY,

OFFICE: ETHELBURGA HOUSE, 70 AND 71, BISHOPSGATE STREET, LONDON, E.C.

2 F

IMPROVED NAIL-CUTTING MACHINERY,

MANUFACTURED BY FREDERICK ORME.

SHOE-RIVET MACHINES	Price	£20
TACK-CUTTING MACHINES	„	30
POINTE DE PARIS NAIL MACHINES	„	30
FLOORING and JOINERS' BRAD MACHINES ..	„	45
BILL-CUTTING MACHINES	„	30

These are first sizes; Larger sizes, Price up to £180.

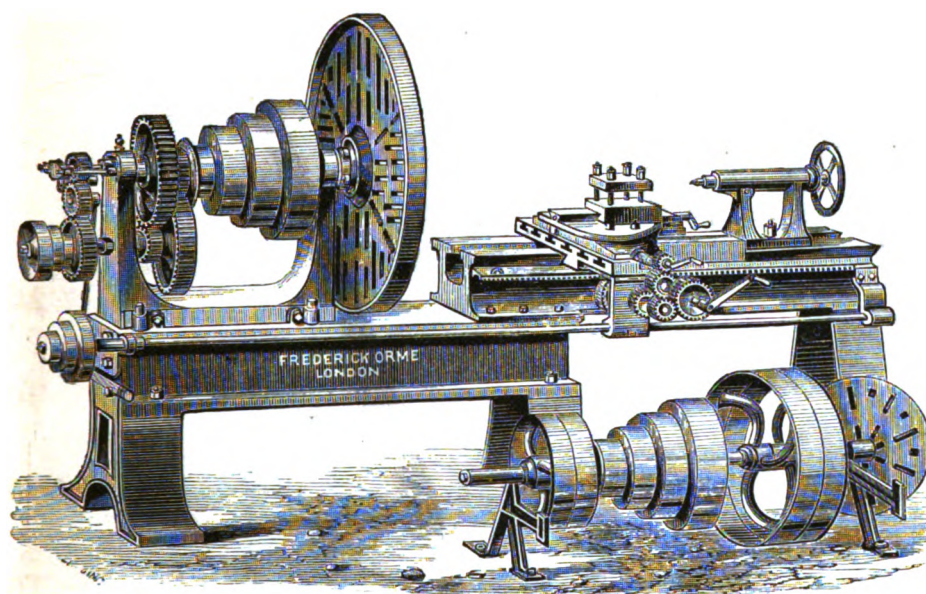
The above Machines are also made **SELF-FEEDING**.



FREDERICK ORME,

OFFICE: ETHELBURGA HOUSE, 70 AND 71, BISHOPSGATE STREET, LONDON, E.C.

PATENT LATHES.



The great **superiority** of these Lathes is owing to the **enormous Belt power they possess**, which is obtained by making the Bed at the fast head stock end lower than at the other (say level with the bottom of gap), and making up the distance with a higher centre fast head, thereby getting room for very large Cones. For instance, the Cone for 12½-inch Centre Lathes is, largest, 3 feet; 2nd, 2 feet 6 inches; 3rd, 2 feet; 4th, 1 foot 6 inches; smallest, 1 foot diameter by 4 inches belt; the fast head stock is 26½ inches high, which is double the size and power of an ordinary 12-inch Lathe.

These Lathes are made extra strong in all parts, with a view to turn off a large amount of work; in fact, to **Forge in the Lathe**.

No.	Height of Centres.	Length of Bed.	Sliding and Surfacing only.	Screw Cutting, Sliding, and Surfacing.	Longer or Shorter Bed per Foot.	Approximate Weight in Cwts.
1	inches. 6½	feet. 8	£ 70	£	£ s.	
2	8½	10	110			
3	10½	15	165			
4	12½	20	225			

Specifications given for other sizes.

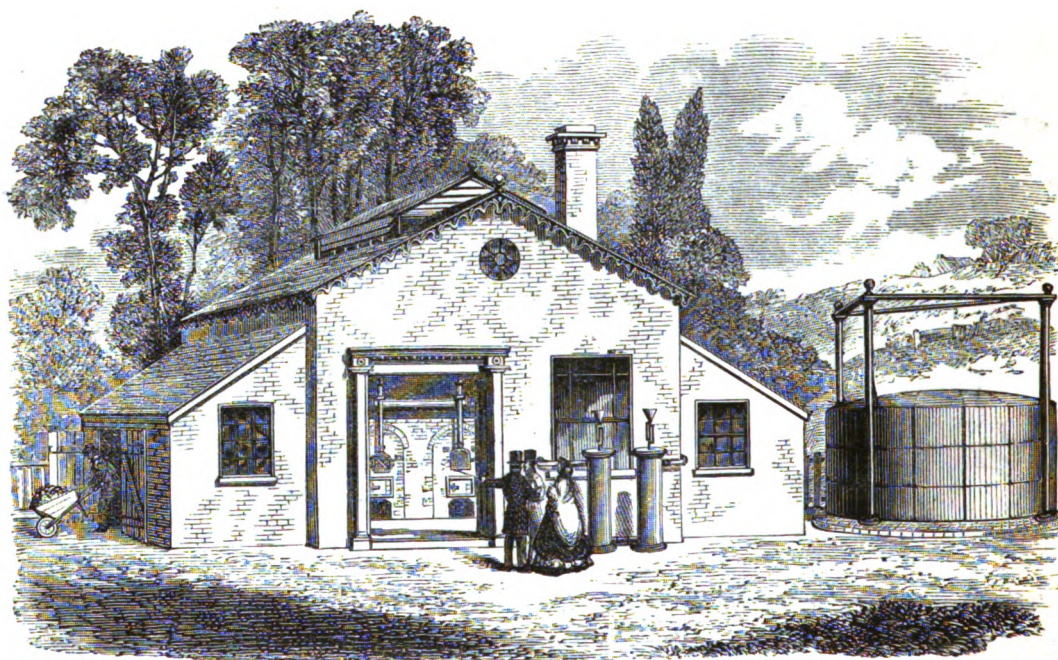
FREDERICK ORME,

OFFICE: ETHELBURGA HOUSE, 70 AND 71, BISHOPSGATE STREET, LONDON, E.C.

2 F 2

PRIVATE GAS WORKS

FOR COUNTRY MANSIONS.



The Woodcut above represents the general appearance of Buildings and Apparatus designed by Messrs. STRODE AND CO. for the manufacture and supply of Coal Gas. A great number of these Works have been for years in operation, supplying Gas of high illuminating power and perfect purity at the Mansions of Noblemen and Gentlemen in all parts of the United Kingdom. These Works, although identical in their several parts with the Coal Gas Works erected for the supply of towns, require some special arrangement for private lighting, and Messrs. STRODE AND CO. have for years made this their special study, and they are prepared, at a short notice, to inspect and advise as to the suitable site for and proper arrangement of such Works in any part of the Kingdom, and will furnish Plans and Estimates for apparatus, pipes and fittings, without charge. They will also give an approximate Estimate if merely informed by letter as to the locality and number of lights that will probably be required.

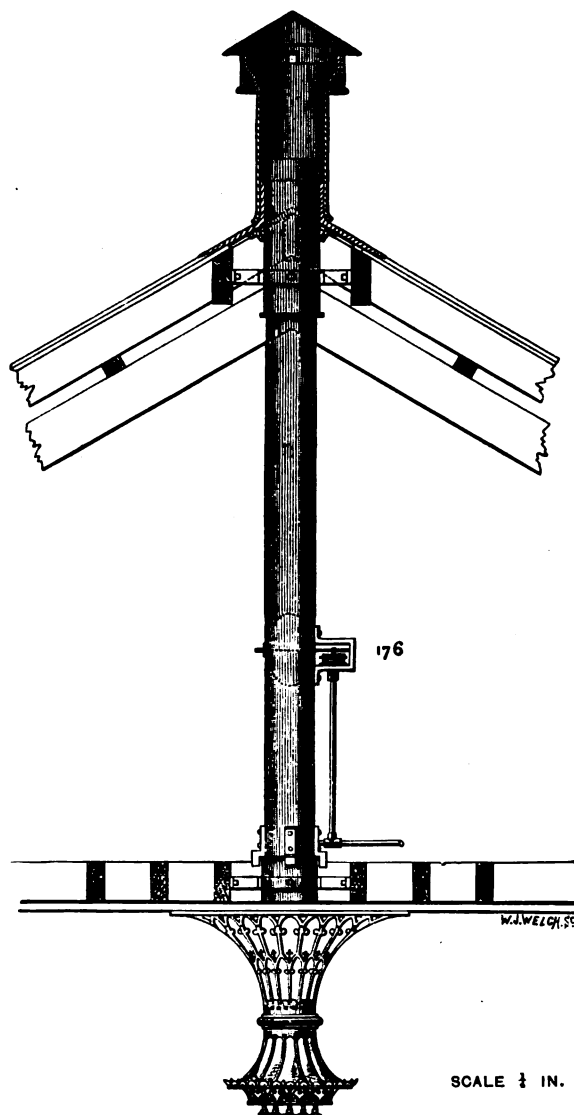
STRODE & CO.,

GAS FITTERS, ENGINEERS, AND CONTRACTORS,

MANUFACTORY, 19, OSNABURGH STREET, REGENT'S PARK, N.W.

SHOW ROOMS, 67, ST. PAUL'S CHURCHYARD, AND 32, COCKSPUR STREET, S.W.,
LONDON.

PATENT VENTILATING SUN BURNERS.

SCALE $\frac{1}{4}$ IN. TO A FOOT.

This Plate shows the usual method of arranging and fixing a Sun Burner in a Church, Hall, or any large room which has no other apartment over it, and when consequently the Ventilating Tube or Shaft can be made to pass directly through the roof into the open air.

No. 176 indicates the Self-acting Valve, necessary in this case for preventing a down draught of cold air when the Sun Burner is not lighted.

N.B.—In sending orders for Sun Burners it is necessary to give the size of the place to be lighted, with Plan and Section of roof and ceiling; or in case of rooms over, a Plan showing construction of floor and ceiling, and position of any flue that could be made available.

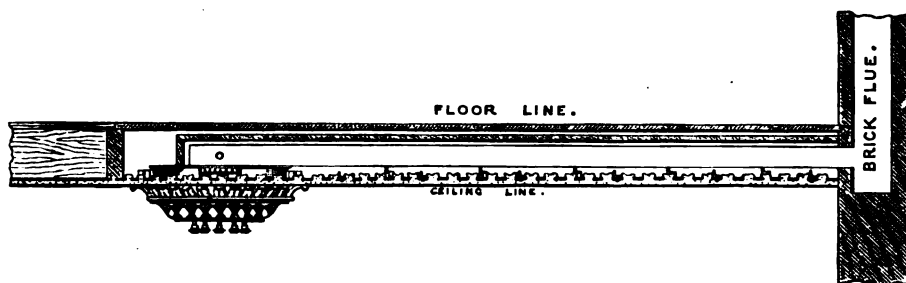
STRODE & CO.,

GAS FITTERS, ENGINEERS, AND CONTRACTORS,

MANUFACTORY, 19, OSNABURGH STREET, REGENT'S PARK, N.W.

SHOW ROOMS, 67, ST. PAUL'S CHURCHYARD, AND 32, COCKSPUR STREET, S.W.,
LONDON.

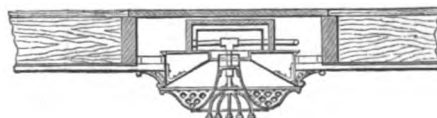
STRODE AND CO.'S PATENT VENTILATING SUN BURNERS.



LONGITUDINAL SECTION, SHOWING SUN-BURNER AND HORIZONTAL FLUE.



PLAN OF SUN BURNER.



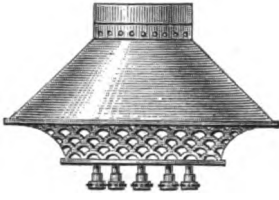
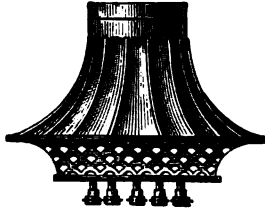
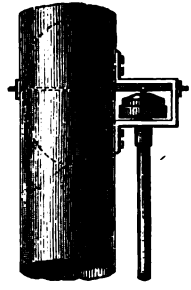
SECTION OF SUN BURNER.

SCALE $\frac{1}{4}$ IN. TO A FOOT.

The above Sections and Plan show the method of fixing Sun Burners, constructing Horizontal Flues for Ventilation, and conducting them into a Vertical Chimney, in cases wherein the existence of rooms over those requiring to be lighted prevent flue pipes from being carried direct to the external air.

STRODE & CO.,
 GAS FITTERS, ENGINEERS, AND CONTRACTORS,
 MANUFACTORY, 19, OSNABURGH STREET, REGENT'S PARK, N.W.
 SHOW ROOMS, 67, ST. PAUL'S CHURCHYARD, AND 32, COCKSPUR STREET, S.W.,
 LONDON.

*List of Prices of Strode and Co's Patent Sun Burners
and Self-Acting Valves.*

JETS.	Extreme Diameter of Sun Burner.	Diameter of Flue Pipe.	 No. 163.			 No. 162.			 Valve with Mercury.		
	inches.	inches.	£	s.	d.	£	s.	d.	£	s.	d.
9	15	5	5	10	0	6	0	0	5	4	0
12	17	6	6	0	0	7	0	0	5	4	0
15	20	7	6	10	0	8	0	0	5	8	0
20	24	8	8	10	0	10	0	0	5	8	0
27	29	10	10	10	0	12	10	0	5	12	0
35	31	10	11	0	0	13	0	0	5	12	0
42	31	10	11	10	0	13	10	0	5	12	0
48	32	12	12	10	0	15	0	0	6	4	0
56	32	12	13	0	0	15	10	0	6	4	0
63	34	12	13	10	0	16	0	0	6	4	0
81	42	14	18	0	0	21	0	0	7	10	0
104	44	15	21	0	0	26	0	0	7	10	0
117	46	16	24	0	0	30	0	0	7	10	0
153	48	18	28	0	0	36	0	0	10	4	0
171	50	18	30	0	0	40	0	0	10	4	0
225	66	22	40	0	0	50	0	0	13	0	0

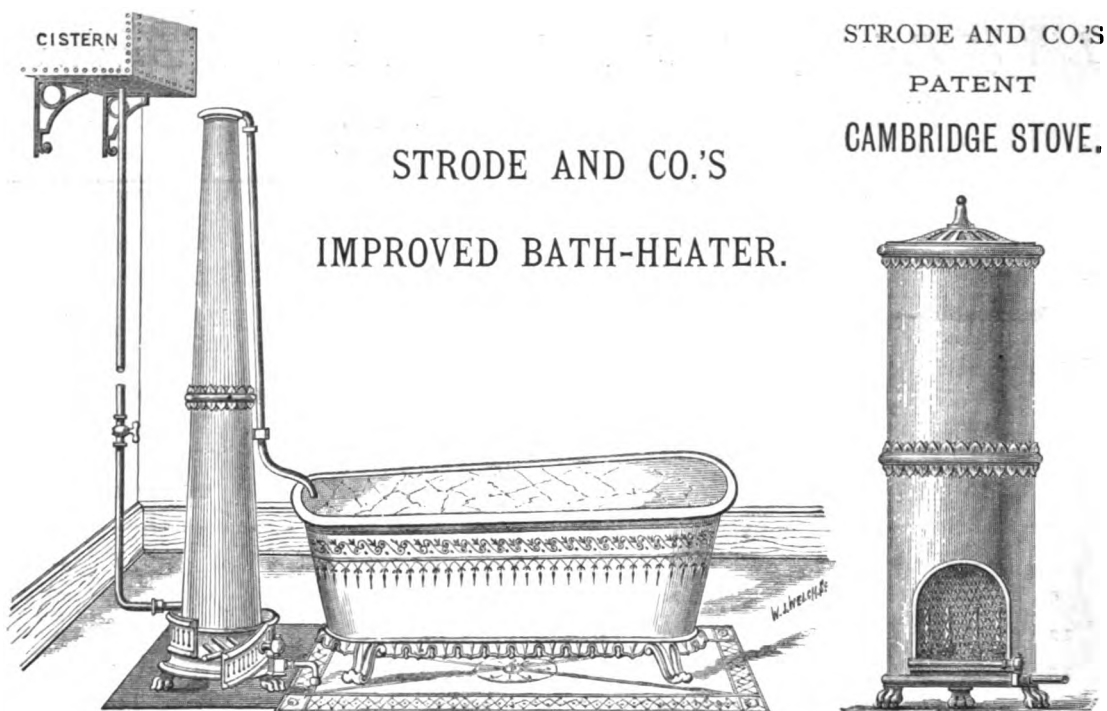
THE ABOVE PRICES ARE EXCLUSIVE OF FLUE PIPES, WIND GUARDS, AND FIXINGS.

STRODE & CO.,

GAS FITTERS, ENGINEERS, AND CONTRACTORS,

MANUFACTORY, 19, OSNABURGH STREET, REGENT'S PARK, N.W.

SHOW ROOMS, 67, ST. PAUL'S CHURCHYARD, AND 32, COCKSPUR STREET, S.W.,
LONDON.



This **Bath and Heater** can be placed for use in any room to which a supply of cold water can be conducted; any existing cistern, as long as it is at a higher level than the top of the Heater, can be made available. The only other requisites are a gas pipe for the supply of the burner, and a waste pipe for emptying the Bath. The advantages of this system are portability, simplicity, and cleanliness. The water runs through the Heater without coming in contact with the products of the combustion of the gas, and any required quantity of pure hot water can be obtained, from a single quart (boiling) in a few minutes, to a bathful (110°) in half an hour.

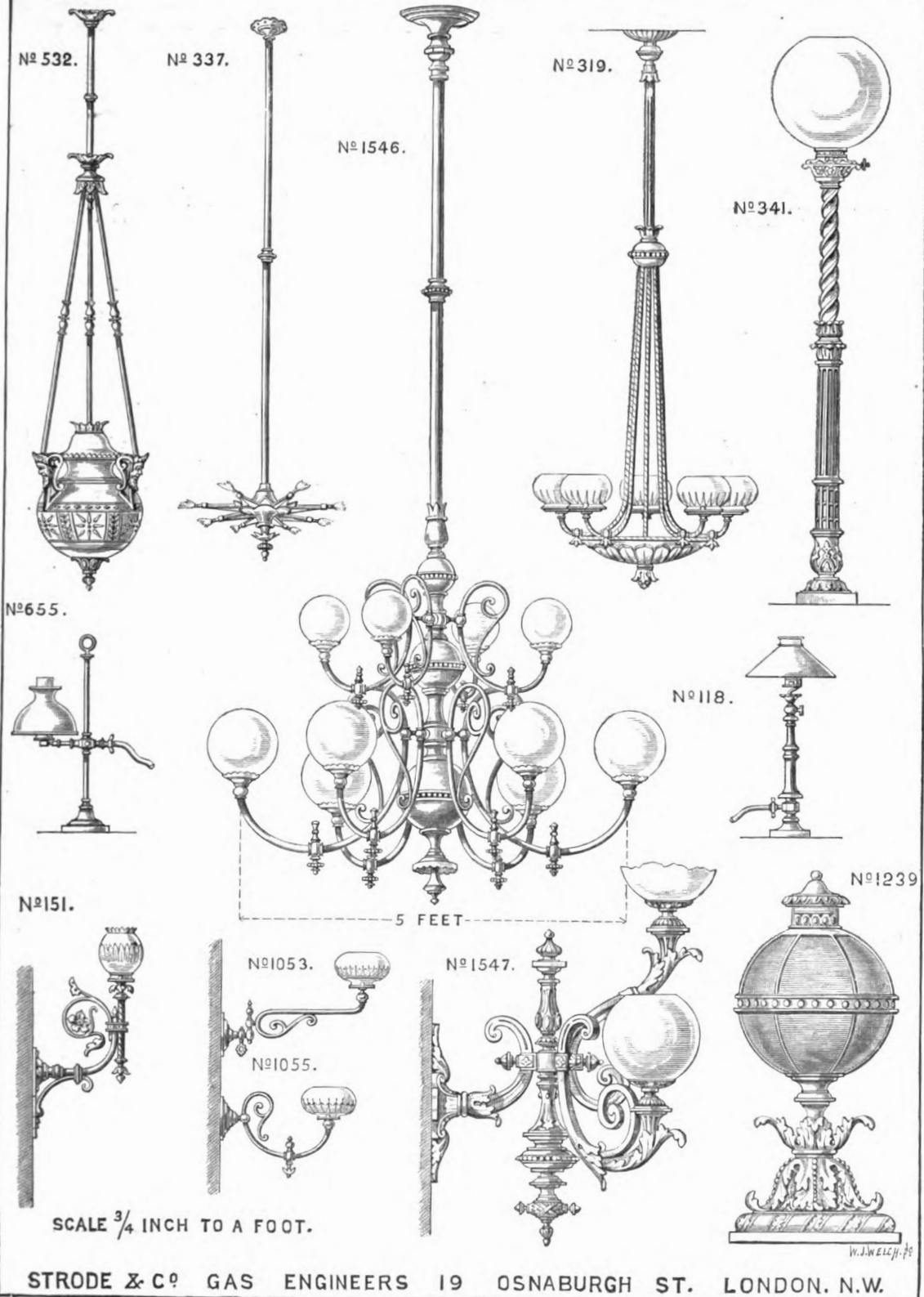
The **Cambridge Gas Stove** is constructed with an inner cylinder concentric to the outer one, with an annular chamber between, in which the gas is burned, the hot products of combustion being made to pass through the entire length of this chamber. The inner cylinder is fitted with numerous layers of wire gauge, through which a current of air (taken from the outside of the building if preferred) passes, becoming thoroughly heated before issuing from the top into the room. Owing to the large surface of heated iron and wire gauge traversed by the air, and the consequent complete abstraction of the heat generated by the gas, this Stove is more economical than any other, and the products of combustion being completely removed, whilst fresh warm air is continually brought in, a pure atmosphere can always be maintained in the room.

STRODE & CO.,

GAS FITTERS, ENGINEERS, AND CONTRACTORS,

MANUFACTORY, 19, OSNABURGH STREET, REGENT'S PARK, N.W.

SHOW ROOMS, 67, ST. PAUL'S CHURCHYARD, AND 32, COCKSPUR STREET, S.W.,
LONDON.



STRODE & CO GAS ENGINEERS 19 OSNABURGH ST. LONDON. N.W.

CENTRIFUGAL PUMP.

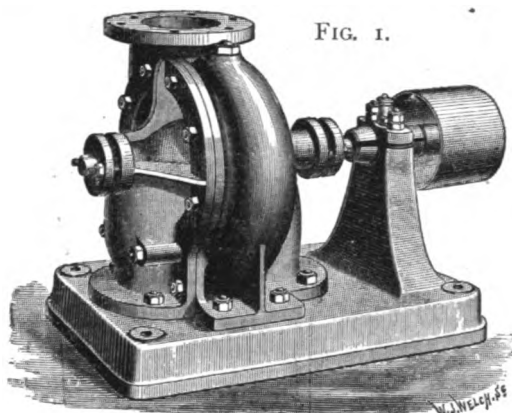


FIG. 1.

BY HER MAJESTY'S

ROYAL LETTERS PATENT.

CENTRIFUGAL PUMP WITH SINGLE PULLEY.

These Pumps have been specially designed to combine the advantages of lightness, neatness, compactness, and cheapness, which will strongly recommend them to Engineers, Contractors, and other purchasers.

The special advantages are:

- 1st. By taking off the movable side (which is done in a few minutes), the Disc can be examined or removed without in any way disturbing the suction or delivery pipes. The advantage of this arrangement is so obvious that further remark is unnecessary.
- 2nd. The Suction passages being formed in the casing of the Pump itself, great neatness and compactness are secured, and the risk of drawing air is greatly reduced.
- 3rd. These Pumps occupy very little space compared with those of other makers. For example, the Engraving above is taken from a photograph of the 6-inch Pump, which only occupies a space about 2 feet 3 inches long, 1 foot 4 inches wide, and 1 foot 9 inches high. Whereas, the space occupied by a 6-inch Pump of the ordinary type, without the above-named improvements (and giving a lower duty in proportion to the power used), is about 2 feet 7 inches long, 2 feet wide, and 2 feet 9 inches high. The construction of the Volute differs essentially from that adopted by other Manufacturers, and has been arrived at after a series of calculations and experiments carefully conducted with a view of ascertaining the largest duty obtainable with a minimum of power and wear and tear.

See also 'Engineering,' of May 28th, 1875.

By a slight modification, these Pumps are also adapted for working down Wells; the Spindle then being vertical, and driven from the surface of the ground.

PRICES OF PUMPS, FOOT VALVES, PIPES, BENDS, AND JOINT RINGS.

Diameter of Suction and Delivery Pipe (in inches).	Approximate Quantity of Water in Gallons per Minute.	Pumps with One Standard and One Pulley. (Fig. 1.)	Pumps with Two Standards and One Pulley.	Pumps with Two Standards and Two Pulleys.	Foot Valves and Gratings.	STRONG CAST-IRON FLANGED PIPES.			Flanged Bends. (each.)	India-rubber Joint Rings. (each.)	Bolts, Nuts, and Washers. (per set.)
						3 ft. length.	6 ft. length.	9 ft. length.			
3	75 and upwards.	£ s.	£ s.	£ s.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	s. d.	s. d.
4	200 "	12 15	14 15	16 10	1 12 6	0 6 6	0 9 8	0 14 6	0 5 10	0 8	0 10
5	300 "	16 0	18 10	19 5	2 5 0	0 8 3	0 14 9	1 2 0	0 7 7	0 11	1 3
6	500 "	21 0	24 5	25 5	3 3 0	0 11 6	1 0 0	1 10 0	0 8 3	1 2	1 6
8	800 "	25 0	29 0	30 0	4 0 0	0 15 0	1 5 0	1 17 3	0 15 0	1 3	2 0
10	1500 "	34 0	39 0	41 0	5 10 0	1 5 0	2 3 6	3 2 0	1 10 9	1 9	4 6
12	1800 "	36 0	41 10	43 10	6 10 0	1 17 0	3 2 0	4 2 0	1 19 6	3 0	5 3
15	3000 "	49 0	57 0	59 0	8 10 0	2 11 6	4 12 0	5 18 0	2 13 6	4 0	6 0
18	4500 "	78 0	90 0	94 0	12 0 0	3 10 6	5 11 0	8 7 0	3 15 6	5 6	7 6
		100 0	115 0	120 0	16 0 0	4 5 6	6 18 0	10 3 0	5 10 0	9 0	8 6

Prices for Larger Sizes on application.

Gun-Metal Discs extra according to Size.

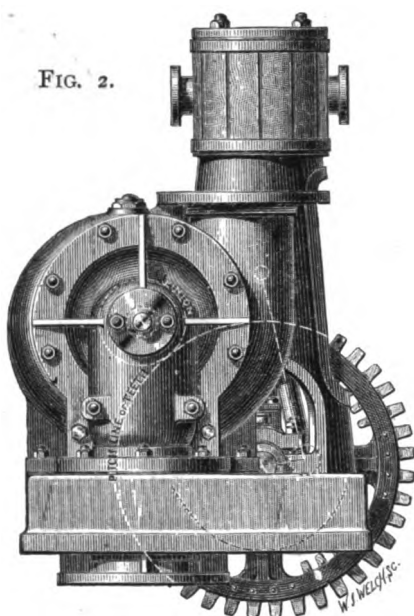
LAWRENCE AND PORTER,
 PATENTEES, 66, PARLIAMENT STREET, S.W.
 GEORGE FLETCHER AND CO.,
 SOLE MAKERS, MASSON WORKS, DERBY.

CENTRIFUGAL PUMPING ENGINE.

FIG. 2.

BY HER MAJESTY'S

ROYAL LETTERS PATENT.



DESCRIPTION OF CENTRIFUGAL PUMPING ENGINE.

The above Illustration represents one of Lawrence and Porter's Pumps (of the construction referred to on the opposite page) combined with a Vertical Engine, the arrangement also being protected by Letters Patent. The chief features of the design are compactness and lightness, which render it peculiarly well adapted for use on Steamships or in other situations where space is limited. The construction is neat and inexpensive, and will commend itself to those having occasion to use this class of machinery.

The Engine Cylinder is mounted on a hollow taper column, open in front, so that the working parts are accessible. The Engine and Pump and their respective bearings are carried on one bed plate, and are arranged diagonally so as, to occupy as little space as possible. The gearing is carried outside the Engine on the opposite side to the Pump.

In the small sizes of these Pumping Engines, the cylinder, column and bed plate are cast in one piece; but in the large sizes they are bolted together.

As the Pumps are driven by gearing, the Engine runs at a very moderate speed, which obviates the great wear and tear and frequent stoppages due to very high speeds where the working parts are reciprocating. These Pumping Engines are also arranged with the Engines horizontal, which in some cases may be more convenient.

PRICES OF PUMPING ENGINES (EITHER VERTICAL OR HORIZONTAL).

For 20 feet Lift, with Steam Pressure of 65 lb.

Diameter of Suction and Delivery Pipe (in inches).	Approximate Quantity of Water in Gallons per Minute.	Price of Pumping Engine. (Fig. 2.)	Extra if Fitted with Expansion Valve.	PRICES of Larger Sizes, or of the same sizes if with HIGHER LIFTS or LOWER STEAM PRESSURE, furnished on application.
6	500	£	£	
8	800	130	..	
10	1500	170	..	
12	1800	205	..	
15	3000	228	29	
18	4500	280	37	
		350	44	

Inquiries accompanied by data as to Height of Lift, quantity of Water to be raised, and as many other particulars as possible, addressed to the Patentees, MESSRS. LAWRENCE AND PORTER, 36, Parliament Street, S.W.; or to the Manufacturers, MESSRS. GEORGE FLETCHER AND CO., Masson Works, Derby, will receive prompt and careful attention.

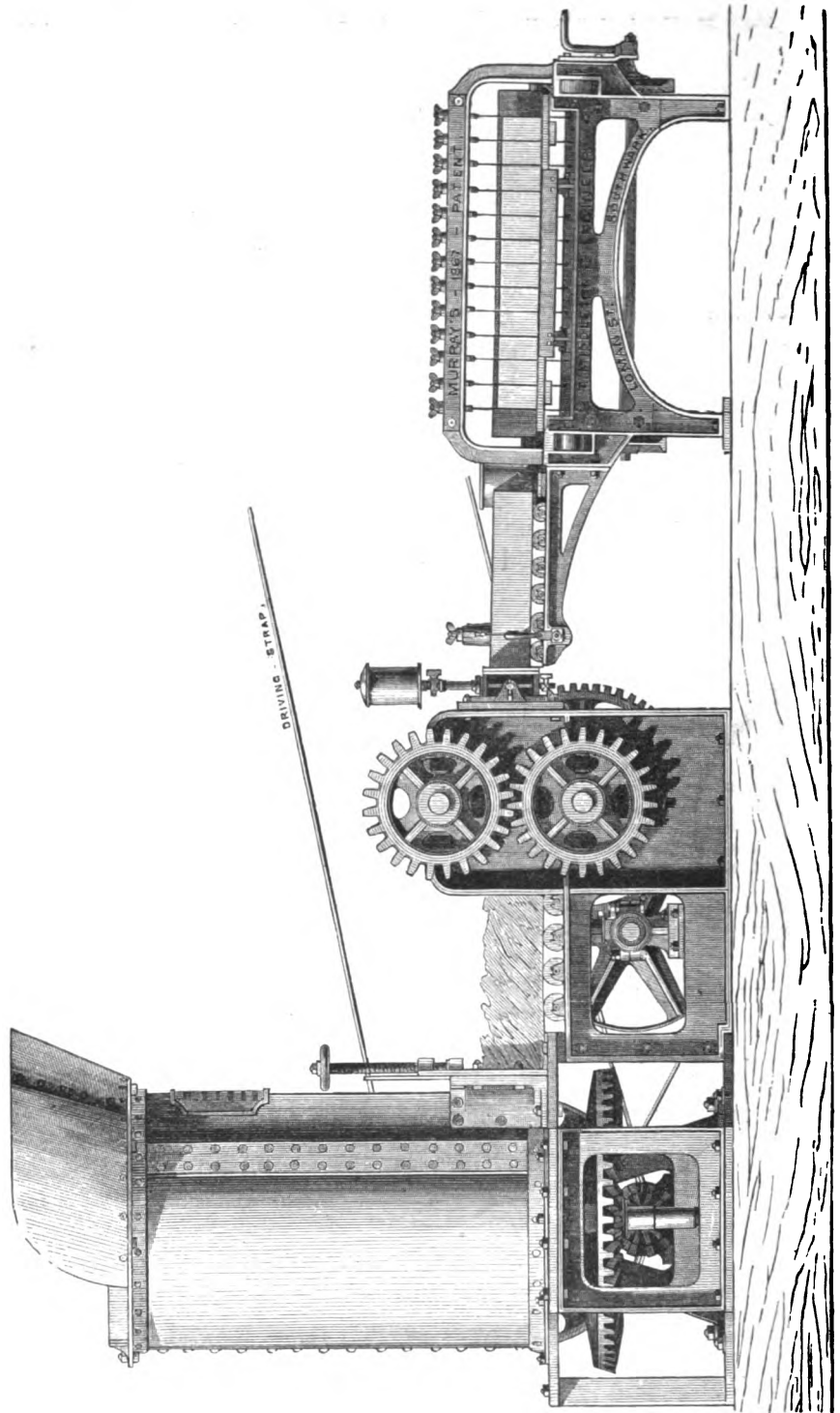
LAWRENCE AND PORTER,
PATENTEES, 36, PARLIAMENT STREET, S.W.
GEORGE FLETCHER AND CO.,
SOLE MAKERS, MASSON WORKS, DERBY.

MURRAY'S PATENT BRICK-MAKING MACHINERY.

SOLE MANUFACTURERS:

THOMAS MIDDLETON AND CO., LOMAN STREET, SOUTHWARK.

FIG. 1.



THOMAS MIDDLETON AND CO.,
LOMAN STREET, SOUTHWARK, LONDON.

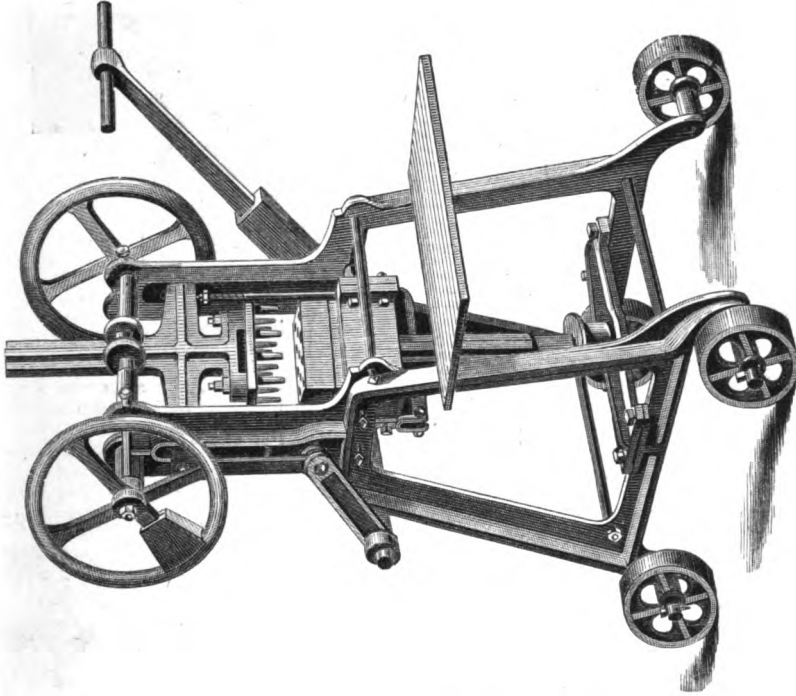
FIG. 2.

Murray's Patent Continuous Delivery Machine, shown at Fig. 1, combines Murray's Patent Lubricating Solid Die and Murray's Patent Cutting Table. The Die, which requires no driving gear and in which water is used for lubrication, produces a perfect stream with sharp arris: and the Cutting Table possesses the great advantage of working a Continuous or non-intermittent stream of clay. The Dies and Cutting Tables can be used with any other machine, together or separately.

Fig. 2. Murray's Patent Brick Press can be arranged to work either by Hand or Steam power. The ordinary size as shown with Press, 4000 to 5000 per day of ten hours.

The boxes are self lubricating, and, by the action of the lever making a stroke down and up again, the brick is pressed and delivered.

The boxes are readily changed, and any wear can be easily taken up.



PRICES.

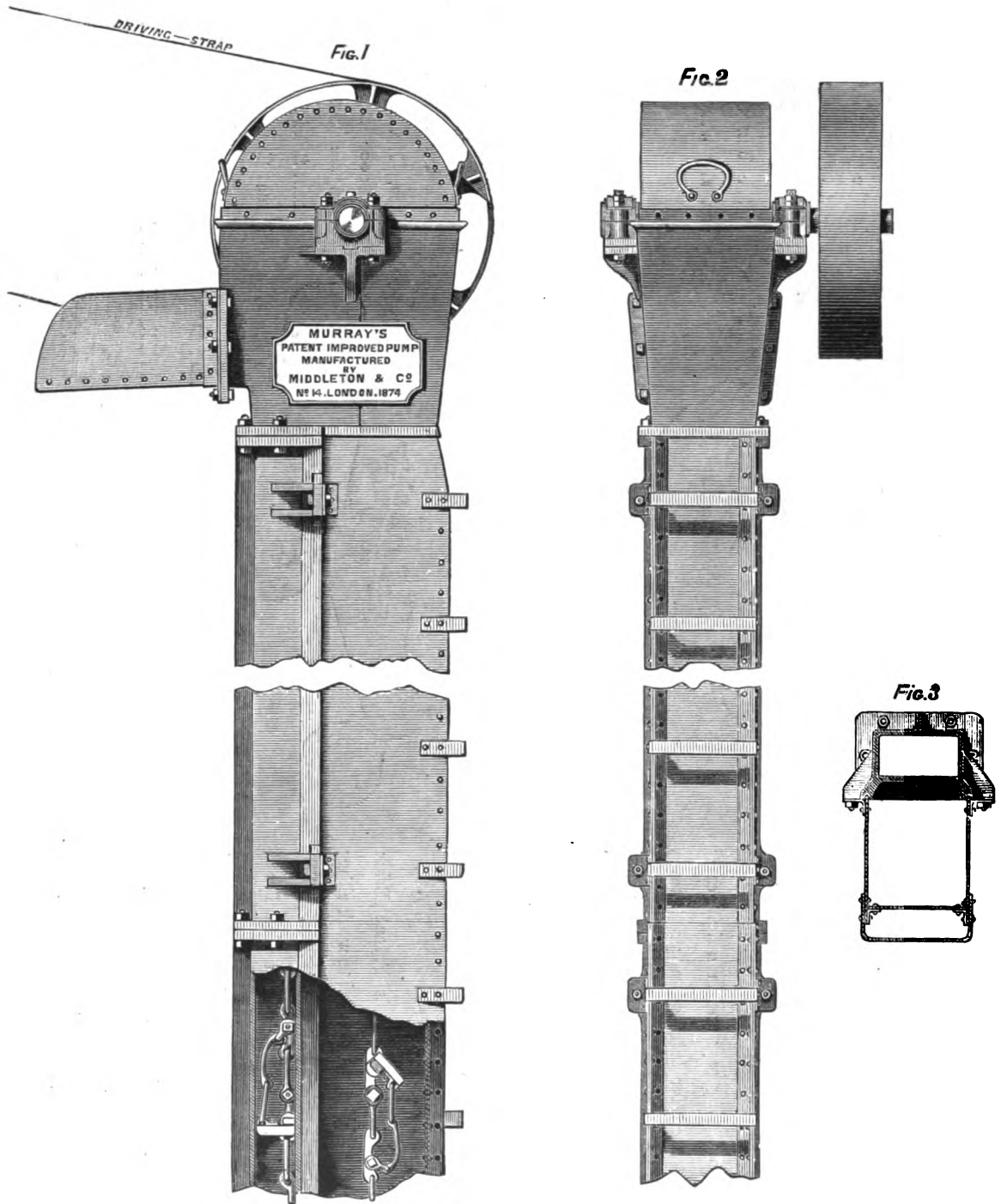
Patent Continuous Delivery Machine, No. 1: 12,000 to 15,000 per day, 8 h.p.	£215
Engine	£215
Ditto, No. 2: 20,000 to 25,000, 10 to 12 h.p.	£280
Engine	£22
Patent Solid Die	£38
Patent Cutting Table ..	£33
Patent Brick Press	£33

IMPROVED CRUSHING ROLLERS, WINDING GEAR, AND OTHER PLANT FOR BRICK MAKING.

ESTIMATES GIVEN ON APPLICATION.

THOMAS MIDDLETON AND CO.,
LOMAN STREET, SOUTHWARK, LONDON.

*Murray's Improved Patent Combined Wrought-Iron
and Cast-Iron Chain Pump.*



THOMAS MIDDLETON AND CO.,
LOMAN STREET, SOUTHWARK, LONDON.

MURRAY'S IMPROVED PATENT CHAIN PUMP.

MANUFACTURED ONLY BY

THOMAS MIDDLETON AND CO., LOMAN STREET, SOUTHWARK,
LONDON.

These Pumps are an improvement upon the well-known Murray's Patent Chain Pump, which has met with marked approval from Contractors, Engineers, &c.

The improvement consists in combining with a Cast-Iron Working Barrel a Wrought-Iron Casing for the descending chain. Thus constructed, the Pump has all the advantages of the old Wrought-Iron Pump at less cost, while the Barrel can never leak, as there are no Rivets in it. It is therefore well adapted for Sinking purposes.

LIST OF PRICES.*

No.	Sizes of Pump.	Number of Gallons per Minute.			H.P. for 10 ft. high.						
Single Chains, Geared Heads extra, under 40 feet high.	1 8 × 4	500	10 feet high.	£ 40	s. 0	d. 0	1	{ For each additional foot in height, add }	£ 2	s. 14	d. 0
	2 10 „ 5	700	„	50	0	0	1'4		„	„	3 6 0
	3 12 „ 6	1000	„	60	0	0	2		„	„	3 18 0
	4 14 „ 7	1300	„	70	0	0	2'63		„	„	4 8 0
	5 16 „ 8	1600	„	80	0	0	3'23		„	„	4 16 0
Double Chains, with Geared Heads.	6 24 „ 8	2000	„	120	0	0	4	„	„	6 18 0	
	7 27 „ 9	2500	„	135	0	0	5	„	„	7 10 0	
	8 30 „ 10	3000	„	150	0	0	6	„	„	8 16 0	
	9 33 „ 11	3500	„	160	0	0	7	„	„	9 10 0	
	10 36 „ 12	4000	„	175	0	0	8	„	„	10 10 0	

* The Pumps are measured from the ground to the bottom of the Delivery Trough; the height of the Lift of water required should be mentioned in giving an order. It is advised that 2 feet be allowed in Nos. 1 to 5, and 3 feet in Nos. 6 to 10 beyond the height of the Lift.

THOMAS MIDDLETON AND CO.,
LOMAN STREET, SOUTHWARK, LONDON

HOLDEN AND CO.'S ZINC ROOFING

Is extensively used in all parts of England and the Colonies, and they can refer with confidence to work already executed as their best recommendation. H. and Co.'s Zinc Roofing is adapted for every description of Roof, viz. Flats of Houses, Railway Stations, Sheds, Stores, &c. The following is a list of a *few* of the works executed by H. and Co. :

	Ft. super.		Ft. super.
Alexandra Palace (twice)	400,000	L. and N. W. Railway, Liverpool, Lime Street, New Station	60,000
North London Railway, most of the Stations	200,000	Liverpool Central Railways	30,000
Victoria Station, L., C., and D. Railway ..	70,000	L. and N. W. Railway, Bushey, Pinner, Harrow, Watford, King's Langley, &c., &c.	100,000
South London Railway	30,000	Bermuda Smithy Roof	
L., B., and S. C., Beddington, Mitcham, Carshalton, &c., &c.		Eastney Barracks, Portsmouth	
Sheerness Dockyards, various Sheds, &c. ..	100,000	Constantinople, British Embassy, Thera	
Deptford ditto		Ditto Pera	
Dobroyd Castle, Todmorden			
New General Post Office, St. Martin's-le-Grand			

And hundreds of others, including public and private buildings in all parts of the United Kingdom.

HOLDEN AND CO. also beg to call attention to their *Stamped Ornamental Zinc, Copper, and Lead*, specially adapted for every description of Roof except Flat, viz. Domes, Curbs, Towers, Mansards, &c. Dormers, Mouldings, Finials, &c., are made to any design or dimension. Messrs. H. and Co. beg to refer to the following as samples of their *Ornamental Work* :

Charing Cross Hotel.	New Meat and Poultry Markets, Smithfield, Eight Domes (Copper).
Cannon Street Hotel.	Union Bank, Charing Cross (Copper).
Towers (Twenty), Belgrave Mansions and Grosvenor Gardens, Marquis of Westminster's Estate, Pimlico.	Criterion Hotel.
Royal Albert Hall of Arts and Sciences, Kensington.	New Premises, Jenks and Holt, Holborn Viaduct.
	New Premises, Holborn Viaduct, corner of Old Bailey.

And a number of others in all parts of the Kingdom.

HOLDEN AND CO. also undertake the supplying and erecting Verandahs, Covered Ways, &c.

HOLDEN AND CO.'s Zinc Roofing prepared, packed, and shipped to any part of the world.

Estimates forwarded for Zinc Roofing of every description ; Plain and Ornamental Verandahs, Sashlights, Skylights, Perforated Zinc Gutters, Pipes, &c.

HOLDEN AND CO. having Machinery specially adapted for every description of Zinc, Copper, and Lead Work, are always in a position to place their customers on the best terms.

HOLDEN AND CO.,

ZINC CONTRACTORS, MERCHANTS, AND MANUFACTURERS,

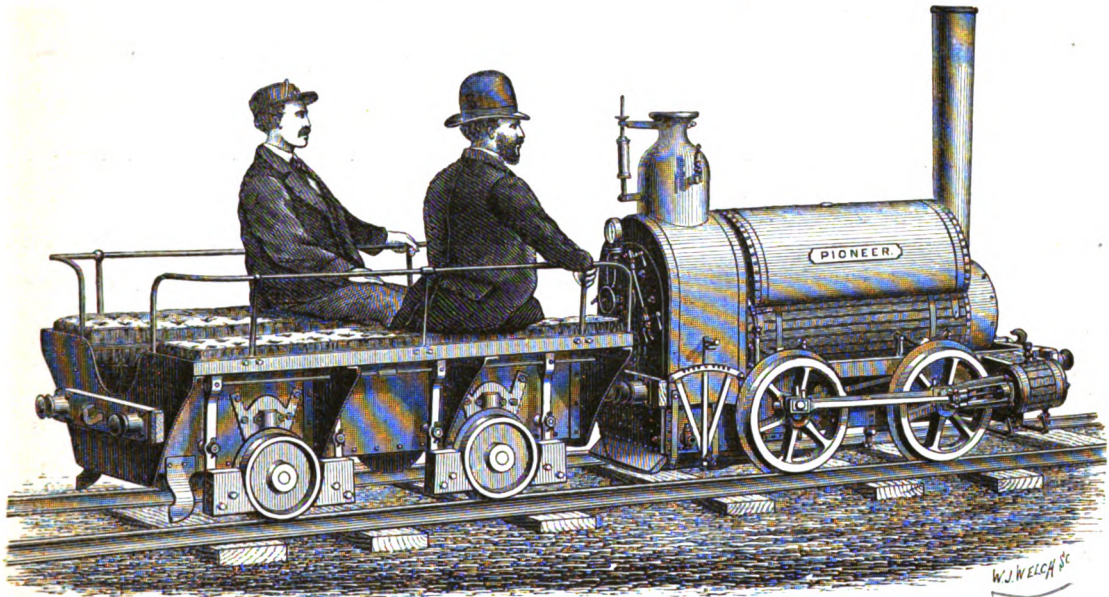
Contractors for Vieille Montagne Zinc Roofing, Stamped Ornamental Zinc, Copper, and Lead Manufacturers, Perforators, Tube and Sash Bar Drawers,

5, WOOD STREET, WESTMINSTER, LONDON.

RANSOMES AND RAPIER,

(Successors to the Railway Business of Messrs. Ransomes and Sims),

5, WESTMINSTER CHAMBERS, LONDON,
AND WATERSIDE WORKS, IPSWICH,
ENGINEERS AND FOUNDERS.

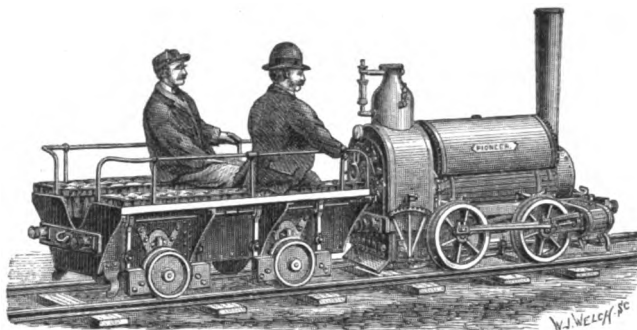


Makers of all kinds of Railway Plant, including:

SMALL LOCOMOTIVES.
WAGONS OF TIMBER OR OF WROUGHT IRON.
RAILWAY STATION PUMPING ENGINES.
RAILWAY WORKSHOP ENGINES, BOILERS, AND SHAFTING.
SWITCHES AND CROSSINGS OF ALL KINDS.
RANSOMES AND BIDDELL'S PATENT CHILLED CROSSINGS.
DEAS AND RAPIER'S PATENT UNIVERSAL SWITCH BOXES.
RAPIER'S PATENT INTERLOCKING APPARATUS.
SIGNAL POSTS AND ALL CONNECTIONS.
RANSOMES AND MAY'S CELEBRATED COMPRESSED KEYS AND TRENAILS.
WATER TANKS, WATER CRANES, AND HYDRANTS.
PUMPS FOR RAILWAY STATIONS, DRIVEN BY STEAM, HAND, OR HORSE POWER.
TURNTABLES OF ALL KINDS AND SIZES, FROM 50 FEET TO 3 FEET.
RAILWAY CRANES OF ALL KINDS, STEAM AND HAND.
WHARF AND WAREHOUSE CRANES OF ALL KINDS.
RAILWAY AXLE-BOXES, COLUMNS, GIRDERS, AND GENERAL CASTINGS.

RANSOMES AND RAPIER,

ENGINEERS, IRONFOUNDERS, AND RAILWAY MATERIALS MANUFACTURERS,
5, WESTMINSTER CHAMBERS, LONDON, AND WATERSIDE IRON-WORKS, IPSWICH.



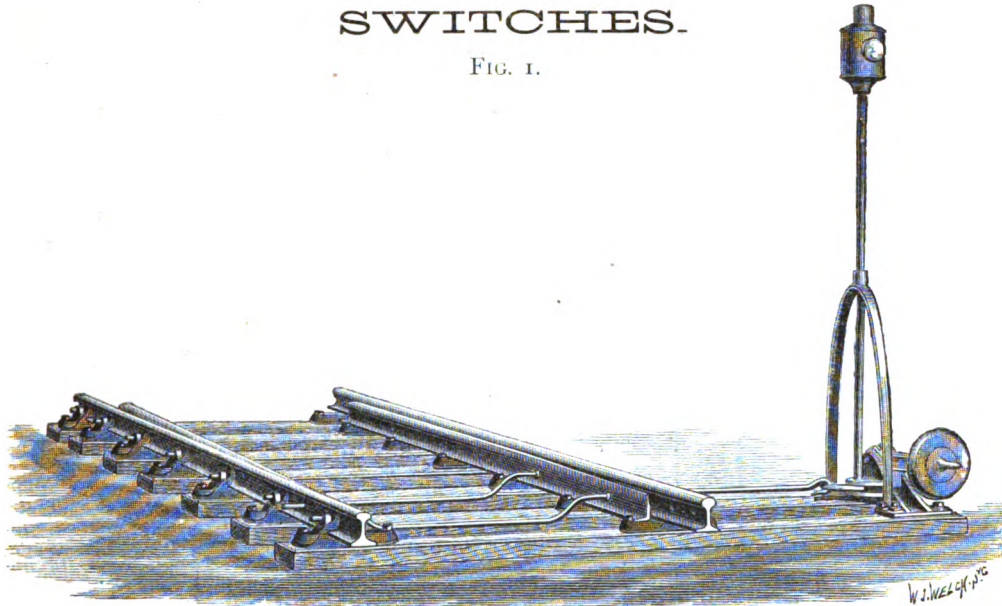
Ransomes and Rapier Manufacture and Supply all kinds of Materials and Fittings for Light Railways, as per the following particulars.

Small Railways made on this principle will (with average cost of Earthworks and Bridges) pay all working expenses, and 7% Dividend as the result of One Full Train each way per day.

ENGINEERS, IRONFOUNDERS, AND RAILWAY MATERIALS MANUFACTURERS,
5. WESTMINSTER CHAMBERS, LONDON, AND WATERSIDE IRON-WORKS, IPSWICH.

SWITCHES.

FIG. 1.



All Woodcuts are from Photographs of work executed by Ransomes and Rapier.

Railway Switches of the most approved construction, made of Steel or Iron Rails, of double-headed or Vignoles section; the Tongues are planed accurately to fit the Stock Rails, and all Fittings are furnished complete, including Switch Box, Connecting and Distance Rods, Slide Chairs, Studs and Bolts, &c., at the following

PRICES.

Weight of Rail.	Length of Tongues.	Length of Stocks.	If Iron Tongues and Iron Stocks.			If Steel Tongues and Iron Stocks.			If Steel Tongues and Steel Stocks.		
lb.	feet. inches.	feet. inches.	£	s.	d.	£	s.	d.	£	s.	d.
40	*9 0	12 0	9	10	0	10	5	0	11	0	0
"	12 0	15 0	11	10	0	12	5	0	13	0	0
"	15 0	18 0	14	0	0	15	0	0	16	0	0
75	*12 0	15 0	15	10	0	16	10	0	17	10	0
"	15 0	18 0	18	0	0	19	10	0	21	0	0
"	18 0	21 0	20	10	0	22	10	0	24	10	0

Holding-down Bolts for Switches of 40-lb. Rails, 10s. per set.

" " " 75 " " 12s. 6d. "

* The Switches marked thus are those which are usually adopted.

SWITCH BOXES.

Switch Boxes of all kinds. Also Deas and Rapier's Universal Switch Box, made either with Turnover handle or rigid handle; the handles are interchangeable, so that Turnover handles can be substituted for rigid, and *vice versa*.

PRICES.

Weight of Rail.	Price of Box.			Weight of Rail.	Price of Box.			Weight of Rail.	Price of Box.		
lb.	£	s.	d.	lb.	£	s.	d.	lb.	£	s.	d.
80	2	10	0	70	2	5	0	40	1	15	0

SWITCH INDICATORS.

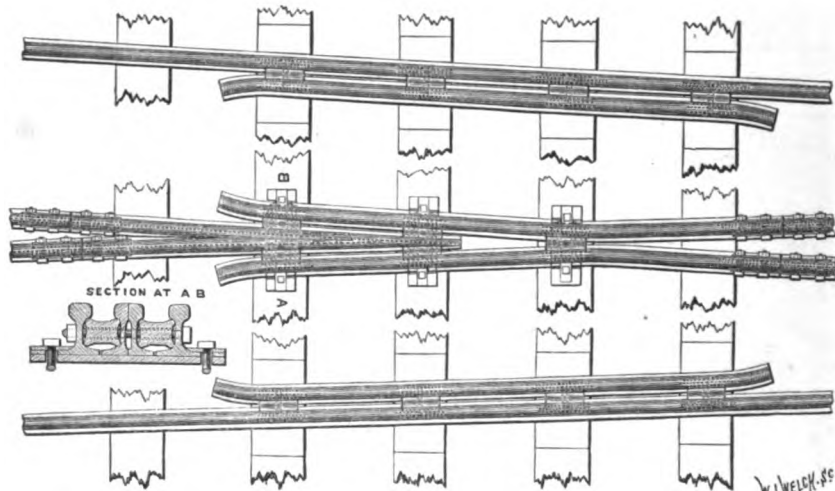
Switch Box, with Deas and Rapier's Patent Indicator, Price £7 5s.; Switch Box, with Russian or Continental Indicator, Price £5 10s., with Lamp complete in both cases.

RANSOMES AND RAPIER,

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CROSSINGS.

FIG. 2.



All Woodcuts are from Photographs of work executed by Ransomes and Rapier.

CROSSINGS.

The best Crossings for Main-Line use are those made of Bessemer Steel Rails. They can be made reversible or not, as may be preferred.

PRICES (ANY ANGLE).

Weight of Rail.	Price of Crossing in Iron.			Price of Crossing in Steel.			Price of Check Rails and Fittings.			Holding-down Bolts.		
lb.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
40	5	10	0	6	10	0	2	2	0	0	7	6
75	8	0	0	9	10	0	3	10	0	0	10	0

For Sidings and Subordinate Lines, Ransomes and Biddell's CHILLED CROSSINGS are the best and most durable, at the following PRICES.

Angle of Crossing ..	1 in 6	1 in 6½	1 in 7	1 in 7½	1 in 8	1 in 8½	1 in 9	1 in 10	1 in 11	1 in 12
Weight of Rails, 40 lb.	£ 5 0	£ 5 5	£ 5 10	£ 5 15	£ 5 15	£ 6 0	£ 6 5	£ 6 10	£ 6 15	£ 7 0
Weight of Rails, 75 lb.	6 0	6 5	6 10	6 15	7 0	7 5	7 10	8 0	8 10	9 0

Check Rails and Fittings, and Holding-down Bolts for these Crossings, are same prices as for Main-Line Crossings above.

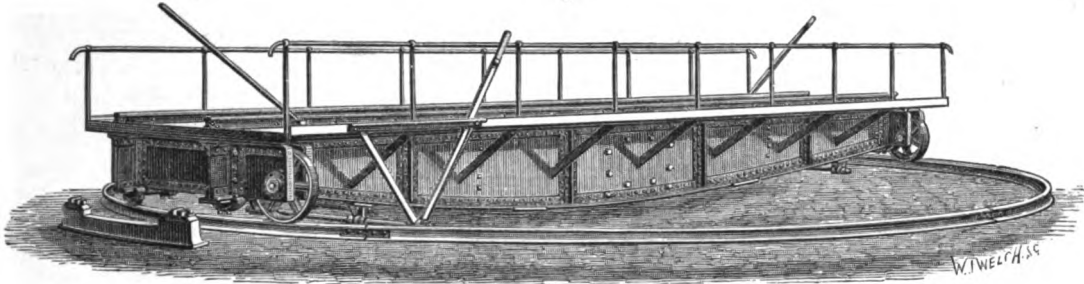
Patterns in Stock for all Angles from 1 in 2 to 1 in 14.

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TURNABLES.

FIG. 3.



All Woodcuts are from Photographs of work executed by Ransomes and Rapier.

Turntables, in all sizes up to 50 feet diameter, for turning Engines, with their Tenders, and 18 to 25 feet diameter for turning Tank Engines, and 10 to 18 feet diameter for Carriages, and 3 to 10 feet diameter for miscellaneous purposes.

The main construction of these Tables consists of two wrought-iron girders on which the rails rest, these girders being braced together at either end by wrought-iron stretchers, and also bolted firmly to a centre casting; they are made on the centre-balance principle, i. e. the load is taken on a steel pivot working in a steel cup fitted in the central pedestal, and by this means one man can easily turn an Engine and Tender. They are fitted with locking gear to keep the Table firmly in position while the Engines are running on and off. The tops of the Tables are covered with wood or with chequered iron plates, as may be preferred. The ends of the girders are fitted with horns and wheels, and also with relieving apparatus. The Tables are also supplied with a wrought-iron pit, if required.

PRICES.

30 to 50 feet diam. for engines and tenders, £9 per foot diameter.

18 to 25 feet " " £8 " "

Extras: Chequer-plate top, £2 5s. per foot diam. ; wrought-iron pit, £2 5s. per foot diameter.

10 to 18 feet diam., for turning carriages and wagons. £7 per foot diam., with wood top and iron pit.

" " " " £9 ditto, with chequer-plate top and iron pit.

3 to 9 feet diameter, for workshops, warehouses, &c., £6 per foot diam., with wrought or cast iron top and cast-iron pit.

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2 H 2

FOOT BRIDGE FOR CROSSING A RAILWAY.

FIG. 4.



All Woodcuts are from Photographs of work executed by Ransomes and Rapier.

FOOT BRIDGES IN CAST OR WROUGHT IRON.

ALSO ALL KINDS OF PLAIN AND ORNAMENTAL CASTINGS, MADE FROM A LARGE STOCK OF
PATTERNS FOR COLUMNS, GIRDERS, SASHES, &c., &c.

PRICE OF THE ABOVE BRIDGE IN CAST IRON, COMPLETE, WITH TIMBER STEPS, HANDRAILS,
AND FLOORING, **£220.**

RANSOMES AND RAPIER,
ENGINEERS, IRONFOUNDERS, AND RAILWAY MATERIALS MANUFACTURERS,
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WATER CRANES.

Fig. 5 represents a Swing-Jib Water Crane. The Jib is made either straight, or of the "swan-neck" shape, and of copper or of cast iron, as preferred; the valve may be actuated by a hand wheel fixed on the Jib, and so worked from the tender. The end of the Jib is fitted with a leather hose-pipe and with a chain for pulling the Crane round. The Crane is fitted with a cock for emptying it after use; also, if desired, a gas jet is fitted on to provide against frost, which is effectually done by the circulation of the water caused by the gas jet.

The advantage of this arrangement is that on the least suspicion of frost the gas can be lighted, and the Crane saved from being frozen, thus avoiding the application of braziers and fires, which frequently crack and destroy the Water Cranes.

PRICES.

6" diameter, £48; 8" diameter, £58; including leather hose-pipe.

Hand wheel fixed on the jib. Price £8 10s. extra.

All Woodcuts are from Photographs of work executed by Ransomes and Rapier.

Fig. 6 shows an Improved Standard Water Crane without a Swing Jib: it is fitted with a stop valve and hand wheel at a height of 2' 6" above the ground, and provided with a leather hose-pipe; also a 6-feet length of service pipe, connected to the valve box by a flange at one end, and to the underground service by a spigot at the other end, a T piece is also provided to complete this connection.

PRICES, including Leather Hose and connections.

Diameter 5", £26. Diameter 6", £32. Diameter 7", £39.

HYDRANTS FOR LOCOMOTIVE SHEDS.

Stand post 3 feet high, with valve and nozzle, and cock for drawing off water in buckets, and also 50 feet of leather hose-pipe, and branch pipe for washing out boilers. Price £16 complete.

Underground Hydrant, in sunk box, with 50 feet of hose and branch pipe. Price £14.

FIG. 5.

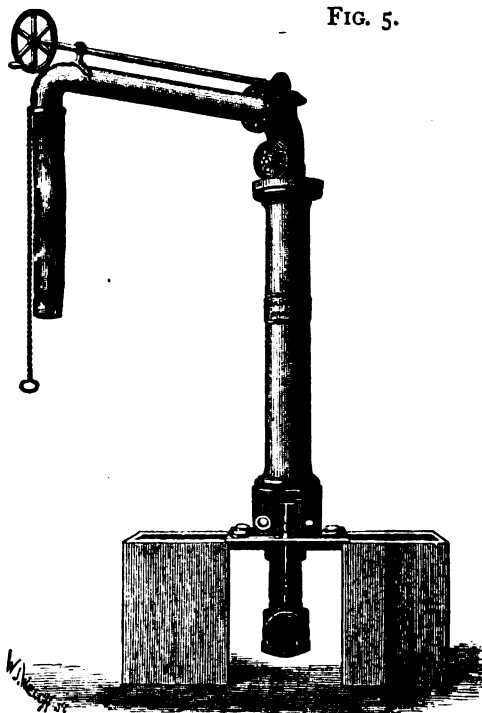
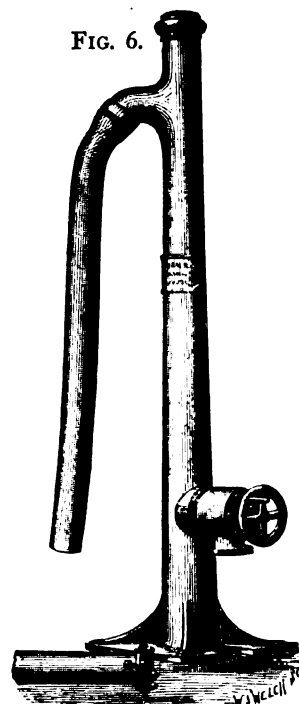


FIG. 6.



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5, WESTMINSTER CHAMBERS, LONDON, AND WATERSIDE IRON-WORKS, IPSWICH.

CAST-IRON WATER TANKS.

FIG. 7.

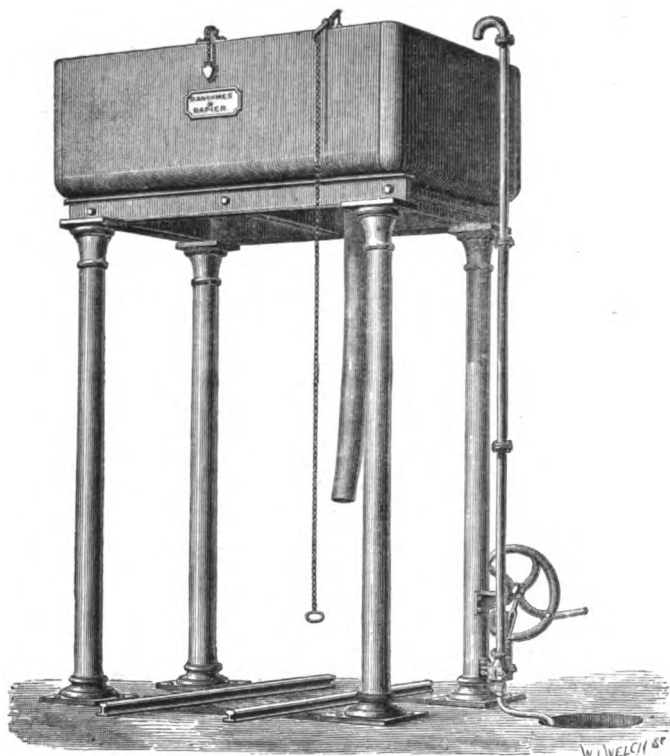


Fig. 7 represents a Cast-Iron Tank, fixed on columns sufficiently high for a locomotive to pass underneath; the edges of the plates are planed die square, so as to ensure a perfect joint, and the plates being all made to template are interchangeable. The Tank is fitted with a hand pump for filling it, and with service valve and hose pipe worked by a lever and chain; it is also fitted with an overflow pipe and with a wood float and indicator. The joints besides being planed are also recessed for stemming with cement.

All Woodcuts are from Photographs of work executed by Ransomes and Rapier.

PRICES OF CAST-IRON TANKS.

11' 6" × 11' 6" × 4' 0" = 3,300 gallons	.. .. .	£111
15' 0" × 15' 0" × 4' 0" = 5,600 "	.. .. .	160
21' 0" × 21' 0" × 4' 6" = 12,300 "	.. .. .	230

Including girders for carrying tank on a brick wall, and all fittings inside the house.

If fixed on columns, £11 per column extra.

Hand Pump for filling the tank, with pipes, complete	£25
Ditto, with two barrels	45
Fixed jib, valve, and leather hose-pipe	8 10s.
Swing jib, for fixing to a wall, with leather hose-pipe	26
Deep well pumps, driven by mule or pony, with two solid gun-metal barrels, 3½" × 9", complete, with all fittings and bolts for fixing, air vessel, and pipes to surface	60

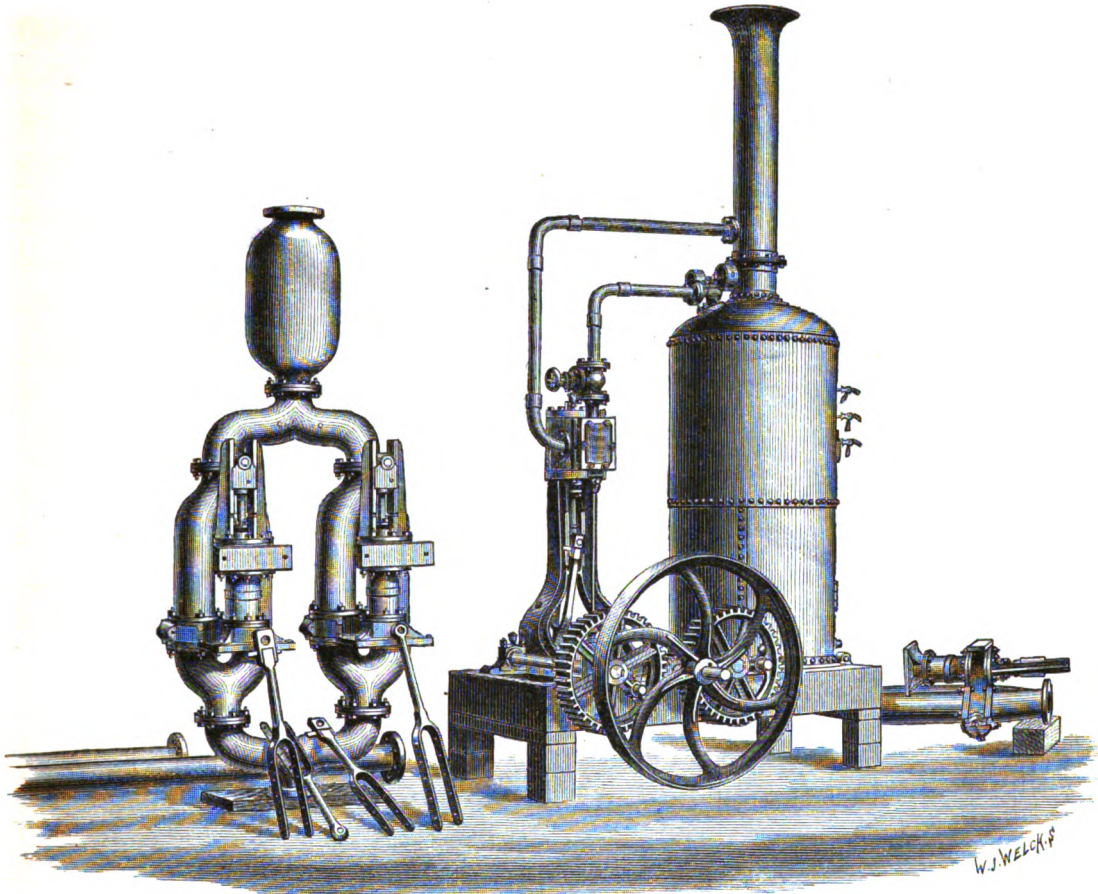
For Wrought-Iron Tanks, see page 240, Fig. 9.

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STEAM PUMPING ENGINE

FOR RAILWAY STATIONS AND OTHER PURPOSES.

FIG. 8.



All Woodcuts are from Photographs of work executed by Ransomes and Rapier.

The above is a very convenient arrangement, as the Engine and Boiler are fixed on the same bed plate, and thus all pipes and connections can be completely fitted before the Engine leaves the Works.

The Pumps have solid gun-metal barrels, and are double acting; they are fixed in a well or pit, and are driven by timber connecting rods, for which the necessary fittings are supplied.

These Engines are made in a great variety of sizes, from half horse-power to 10 horse-power, and with either one or two pumps.

Price of Engine, with 9" Cylinder, and two double-acting pumps, and a 6 horse-power boiler, complete, with all fittings, £350 = 9000 gallons per hour.

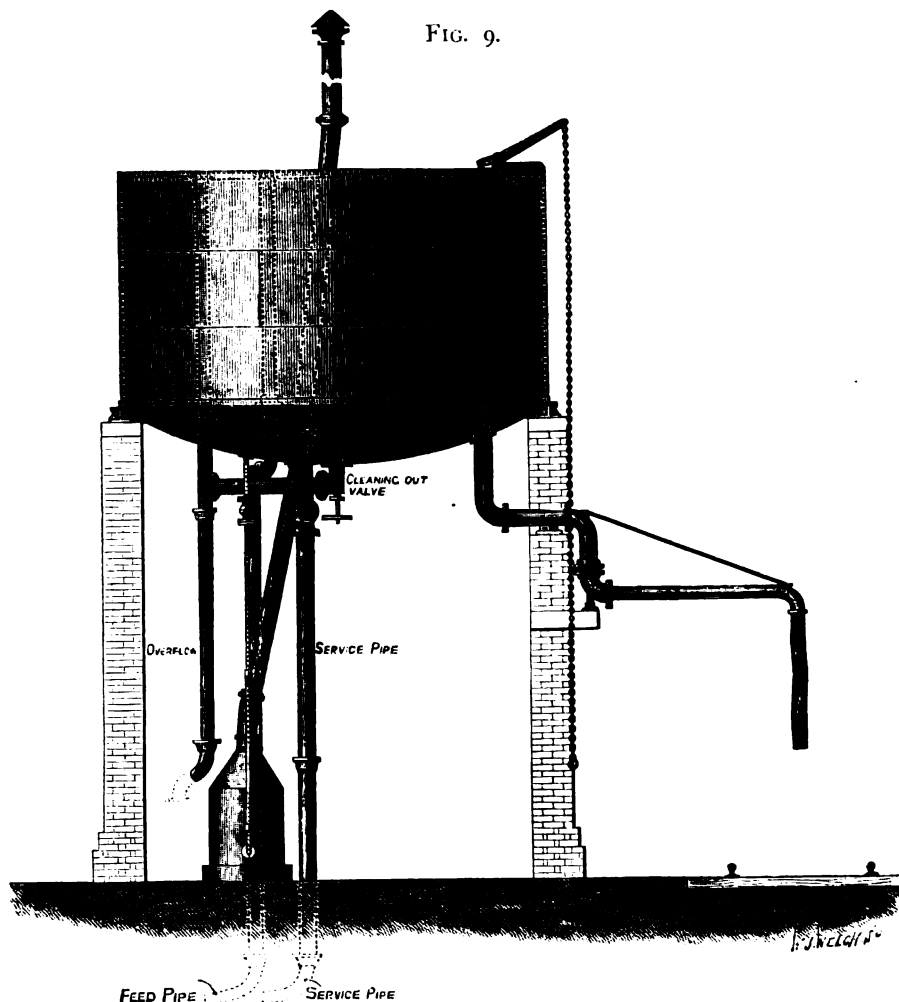
Price of Engine, with 7" Cylinder, and one double-acting pump, with 4 horse-power boiler, and all fittings complete, £240 = 5000 gallons per hour.

Larger and smaller sizes at proportionate prices.

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WROUGHT-IRON WATER TANKS.

FIG. 9.



All Woodcuts are from Photographs of works executed by Ransomes and Rapier.

The above Illustration represents a Circular Station-Tank, made of wrought iron (mounted on a circular cast-iron girder-shaped kerb, or seating, made in segments and bolted together). The Tank plates are all made to template, and are interchangeable.

A copper Swing Jib with leather hose is mounted on a pivot and carried by a stone corbel built in the wall.

For cold climates a heating Boiler with circulating pipes is provided, to be fixed on a stone or cast-iron base in the Tank House, with a wrought-iron chimney passing through the Tank.

These Tanks are also fitted with overflow pipe, cleaning-out valve and pipe, feed pipe, and service pipe.

PRICES OF TANKS.

No. of Gallons.	Diameter.	Depth.	Price of Tank, including overflow pipe, cleaning-out valve and pipe, feed pipe, and service pipe.		
7,700	14' 0"	8' 0"	£	s.	d.
11,250	16' 0"	9' 0"	110	0	0
15,940	18' 0"	10' 0"	130	0	0
			150	0	0

Heating Stove and Chimney, and Circulating Pipes, price £40.

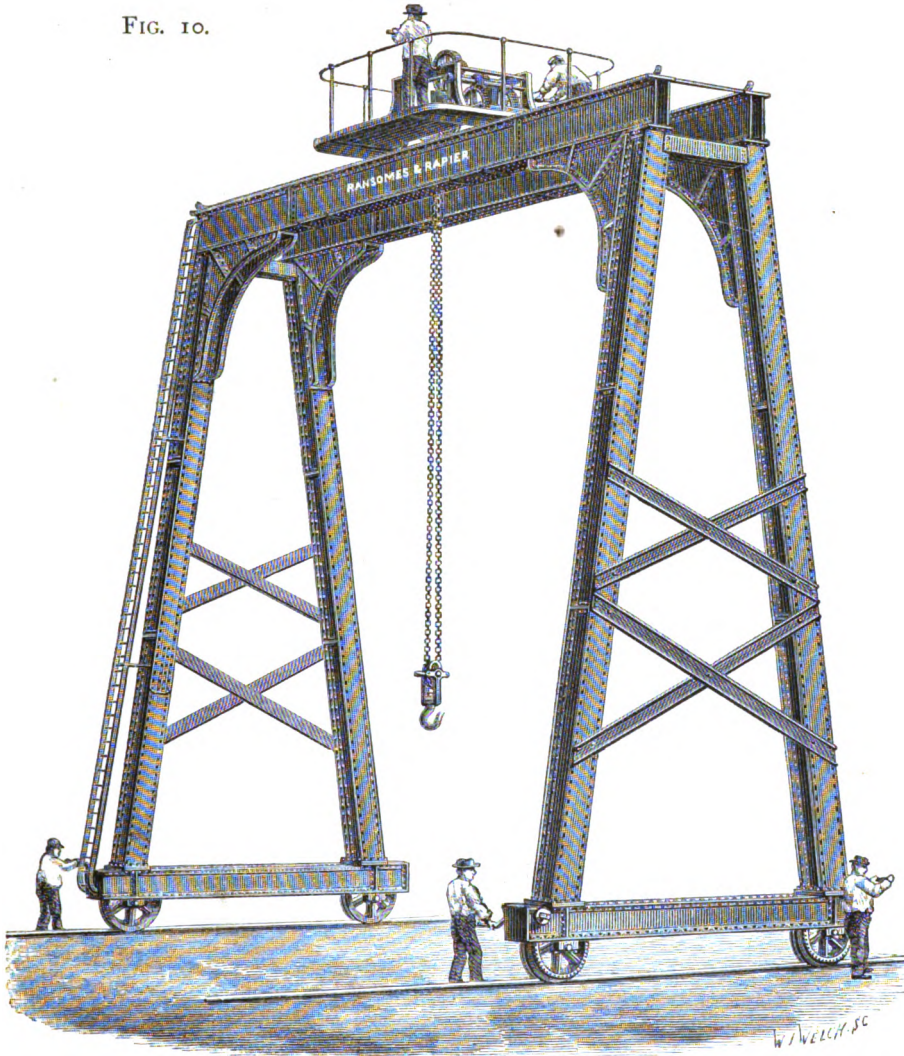
Copper Swing Jib and Connections to Tank, with valve, lever, and chain, price £26.

For Cast-Iron Tanks, see page 238, Fig. 7.

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WELLINGTON CRANES.

FIG. 10.



All Woodcuts are from Photographs of work executed by Ransomes and Rapier.

These Cranes are made of Wrought Iron, on the box-girder principle, as shown in the Illustration. They are thus very easily taken to pieces, and are convenient for shipment and re-erection. All the parts are put together with turned bolts.

The Crab is of very strong construction, and is complete with chain of ample strength, and each chain has a test certificate.

PRICES.

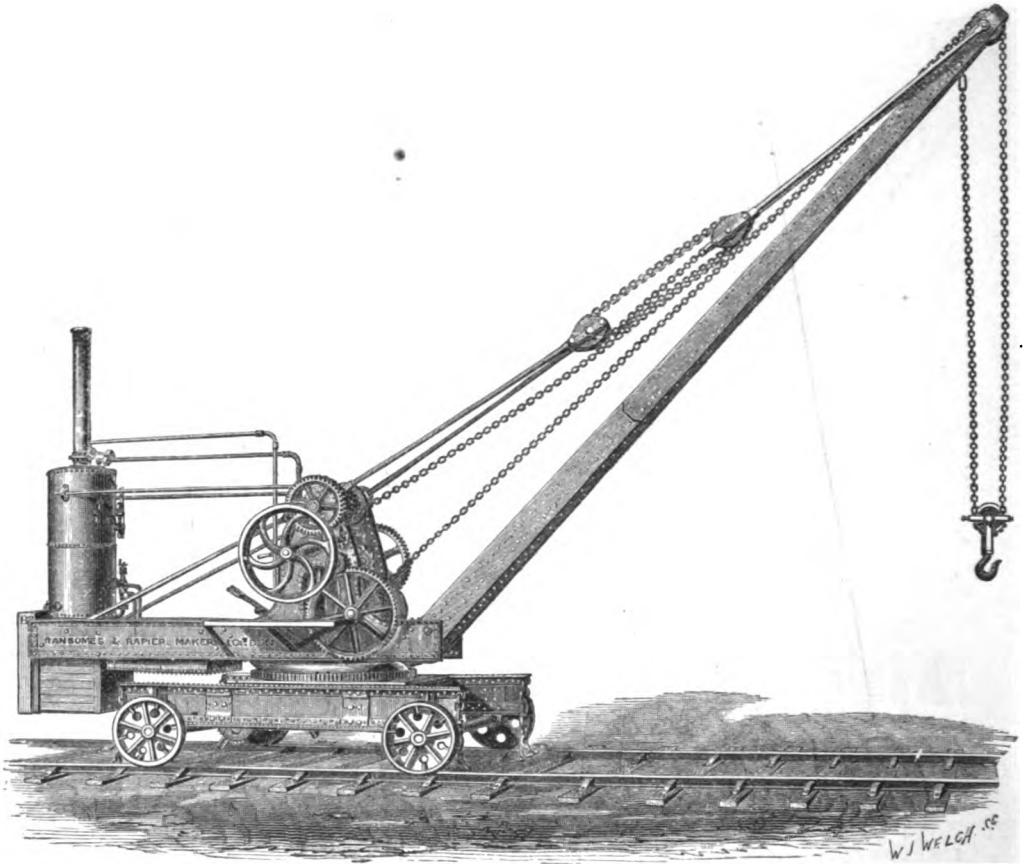
To lift	Span.	Height.	Price.
tons.	feet.	feet.	£
10	20	20	380
15	30	30	550
20	40	40	700

Cranes of any form, size, or strength, at proportionate prices.

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STEAM CRANES.

FIG. 11.



All Woodcuts are from Photographs of work executed by Ransomes and Rapier.

The Woodcut is an illustration of some Steam Cranes recently built. The Framing and Jib are entirely of wrought iron, and the leading dimensions are as follows: Maximum load, 15 tons; radius of Jib, 40 feet; gauge of line, 16 feet; weight of the machine, 40 tons. PRICE £1050.

If to travel by steam power, £165 extra.

Another size, to lift 8 tons at a radius of 25 feet:—Gauge of line, 9 feet; weight of machine, 20 tons. PRICE £620.

If to travel by steam power, £125 extra.

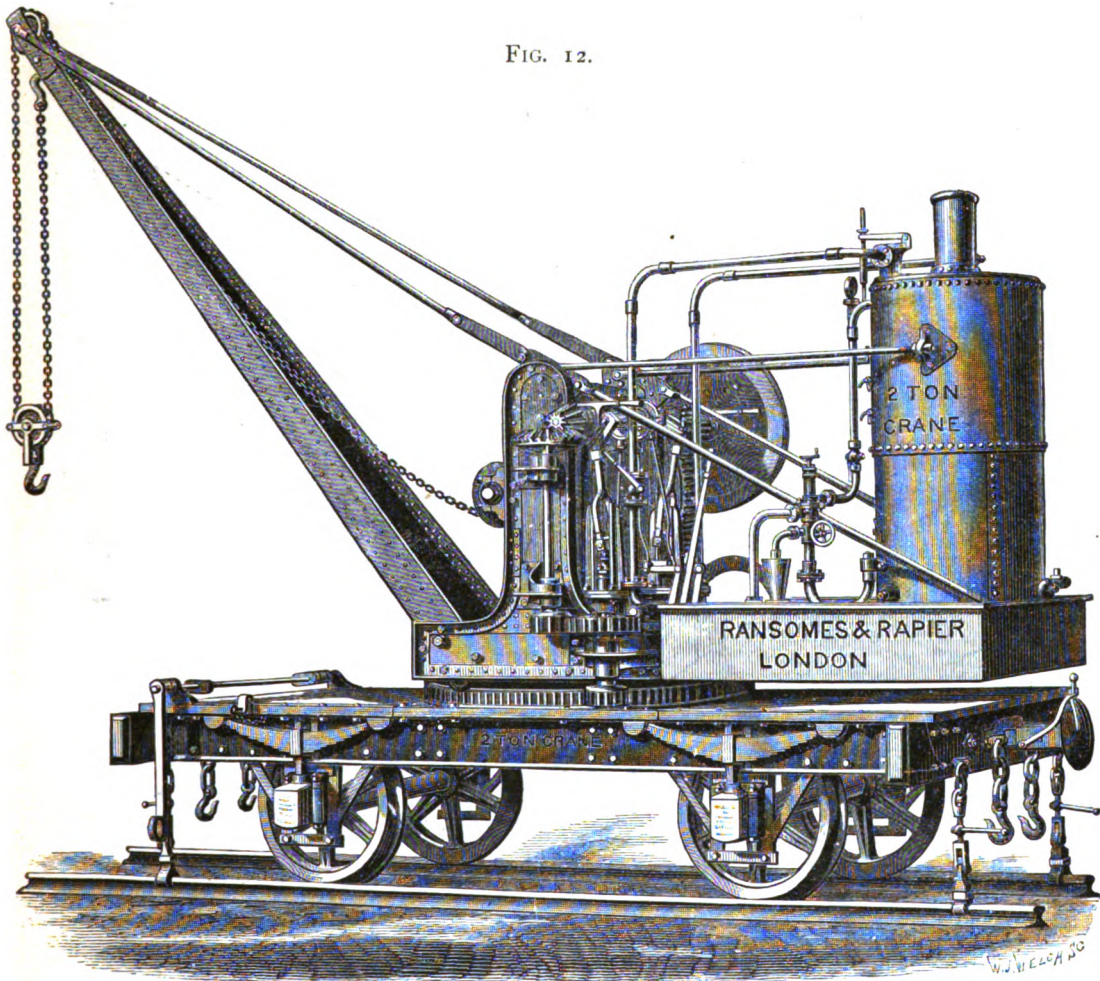
These Cranes are made with adjustable Jibs, so that the load may be taken up close to the Crane and set down at the extreme reach of the Jib, or *vice versa*. The workmanship throughout is of the best Engine-work class.

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RAILWAY CRANES.

FIG. 12.



WITH OR WITHOUT STEAM POWER.

All Woodcuts are from Photographs of work executed by Ransomes and Rapier.

The Carriage is adapted for travelling in company with other vehicles on the railway, and the Jib can be lowered for the same purpose.

Sizes. To lift	Price, with Steam Power.	Price, worked by Hand only.	Radius of Jib.
tons.	£	£	
2	420	270	14 ft.
3	470	300	15 "
5	550	350	16 "
10	820	570	17 "

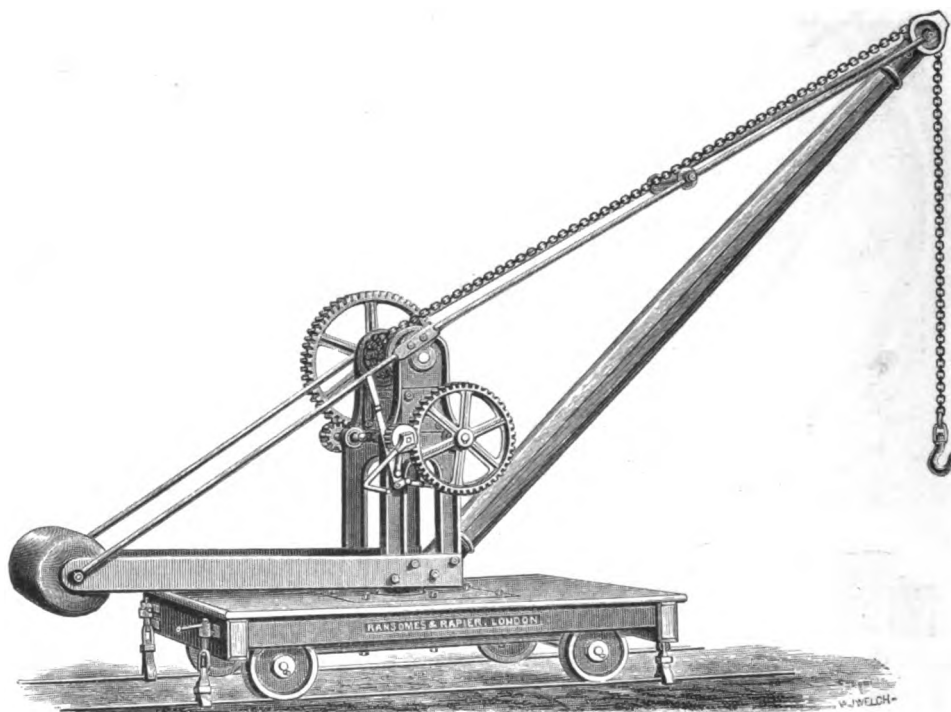
The Cranes are furnished with Rolled Joist Iron Girders for propping them up when the Cranes are at work on heavy loads. The above prices are for gauges not exceeding 5 feet 6 inches.

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WHARF AND WAREHOUSE CRANES.

PORTABLE OR FIXED.

FIG. 13.



All Woodcuts are from Photographs of work executed by Ransome and Rapier.

The Woodcut shows a *Portable Crane* of the kind commonly used on Wharves and in Warehouses. Ransomes and Rapier also make *Fixed Wharf Cranes*, and small *Fixed Warehouse Cranes*, and also *Whip Cranes*.

In all these Cranes wrought iron is used as much as possible, and all the work is got up in the best style. All Chains are tested, and Certificates are sent with them if desired.

PRICES.

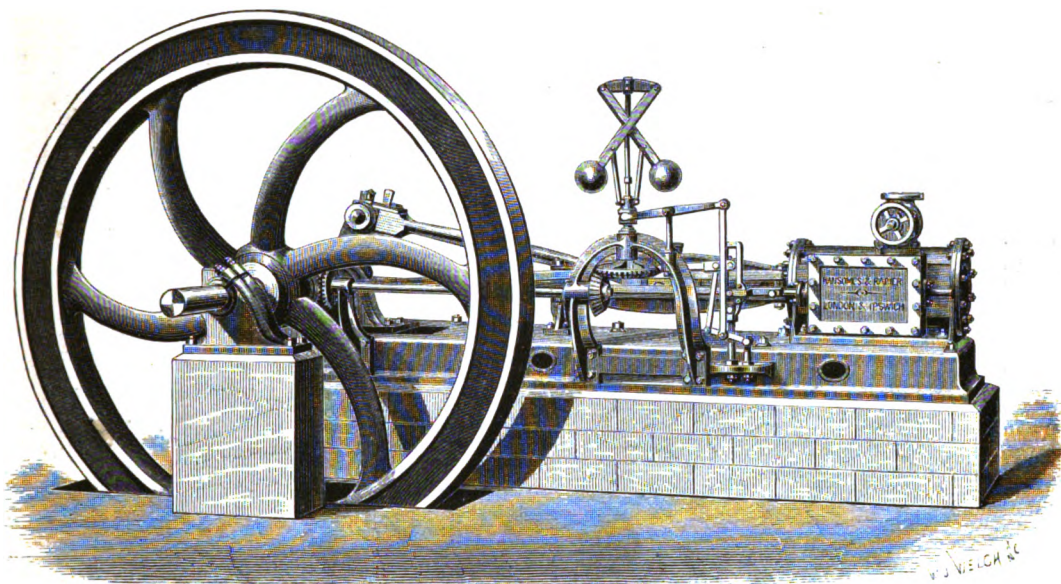
To lift	Portable Crane.	Fixed Wharf Crane.	Fixed Warehouse Crane.	Whip Crane.
tons.	£	£	£	£
1½	100	..	40	45
2	110	..	45	50
3	130	..	60	..
5	250	220	..	..
10	360	300	..	..

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STATIONARY ENGINES AND BOILERS.

FIG. 14.



All Woodcuts are from Photographs of work executed by Ransomes and Rapier.

Stationary Engines specially adapted for driving the machinery of railway workshops, saw mills, and for other purposes. The Woodcut illustrates a Horizontal Engine, but the same Engine is also adapted for placing vertically against a wall. They can be fitted either with or without expansion gear. The expansion gear may be actuated by the governor or by hand, as may be preferred.

PRICES.

Horse-power.	Size of Cylinder.	Price with Single Crank.	Double-cranked Axle, extra.	Expansion Gear, extra.	Cornish, Lancashire, Tubular, or Vertical Boiler.
6	8" x 10"	£ 110	£ 8	£ 15	£ 100
8	9" " 12"	135	10	20	125
10	10" " 14"	160	12	25	150
12	12" " 16"	185	15	30	170
15	14" " 18"	225	18	35	200
20	16" " 21"	290	20	40	250
25	16" " 30"	345	25	45	300
30	18" " 32"	400	30	50	350

The Cornish, Lancashire, and Vertical Boilers all have Galloway tubes in them, which are of great value in increasing the circulation in the Boiler, as well as in adding to the heating surface.

Any of the above Engines can be arranged two together very conveniently, and so that either one can be thrown out of work as circumstances may require.

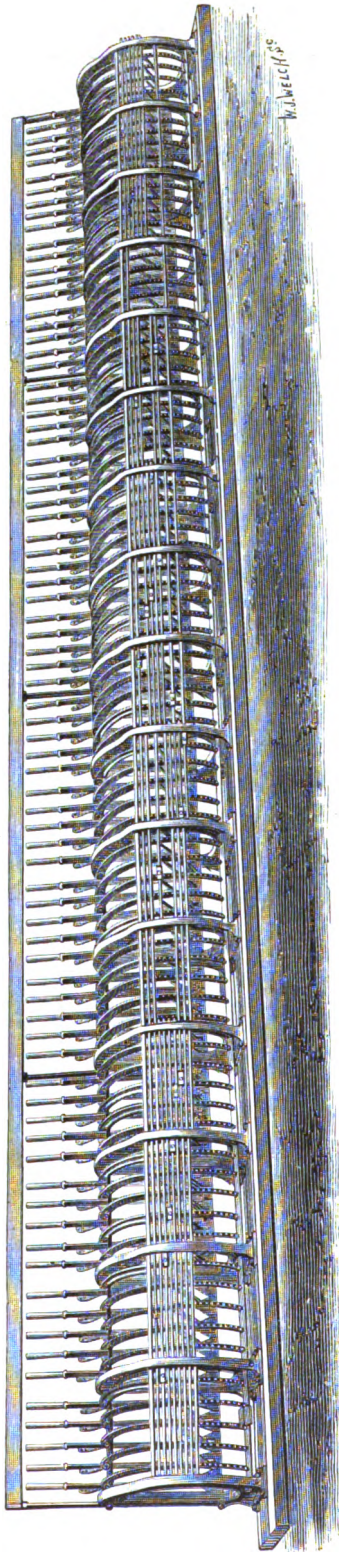
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5, WESTMINSTER CHAMBERS, LONDON, AND WATERSIDE IRON-WORKS, IPSWICH.

RAPIER'S PATENT INTERLOCKING MACHINE,

FOR WORKING THE SIGNALS AND SWITCHES OF RAILWAYS.

FIG. 15.



All Woodcuts are from Photographs of work executed by Ransomes and Rapier.

The Engraving represents a frame containing eighty levers, fixed at the level crossing of the G. N. R. and M. S. L. railways at Lincoln.

This machine consists of a smaller number of moving pieces, and is much simpler than any previously constructed.

Its general principle is as follows: Each lever has a quadrant or sector forged on it, and the levers are all mounted in a frame, so that the sectors pass through a tier of locking bars. Each switch lever has one of these locking bars belonging to, and actuated by, it. Notches are cut in the sectors and in the locking bars in those positions in which the one should be allowed to pass through the other, and wherever "locking" is desired the bar or sector is left solid, and so erroneous movements are prevented.

This system is so complete that an ordinary junction-frame is completely interlocked with only six moving pieces, and the above frame of eighty levers is interlocked with less than thirty moving pieces.

The advantages naturally arising from this very great simplicity are as follows:

1. Certainty and promptness in the locking.
2. Great durability (the machines are guaranteed to require no repairs for ten years).
3. Great strength, all the moving parts being made of wrought iron, and machine cut.
4. All the locking gear is in sight, and is so near to the hand of the operator that he cannot strain or disable it.
5. The apparatus is all above the floor, thus avoiding the large holes usually required in the floor, and this greatly adds to the comfort of the signal houses.

Price £8 per Lever.

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5, WESTMINSTER CHAMBERS, LONDON, AND WATERSIDE IRON-WORKS, IPSWICH.

SEMAPHORE SIGNAL-POSTS

(WROUGHT IRON).

FIG. 16.

SIGNALS of all kinds. The Posts of Wood or Wrought Iron, as may be preferred.

All kinds of FITTINGS for connecting, with Locking Apparatus, supplied on the most reasonable terms.

PRICES OF STATION SIGNAL-POSTS,

WITH TWO ARMS, LAMP WITH TWO LENSES, ETC., COMPLETE.

	15 Feet.			20 Feet.			25 Feet.			30 Feet.		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
Wood Posts	20	0	0	22	0	0	25	0	0	28	0	0
Wrought-Iron Posts	22	0	0	24	0	0	28	0	0	32	0	0

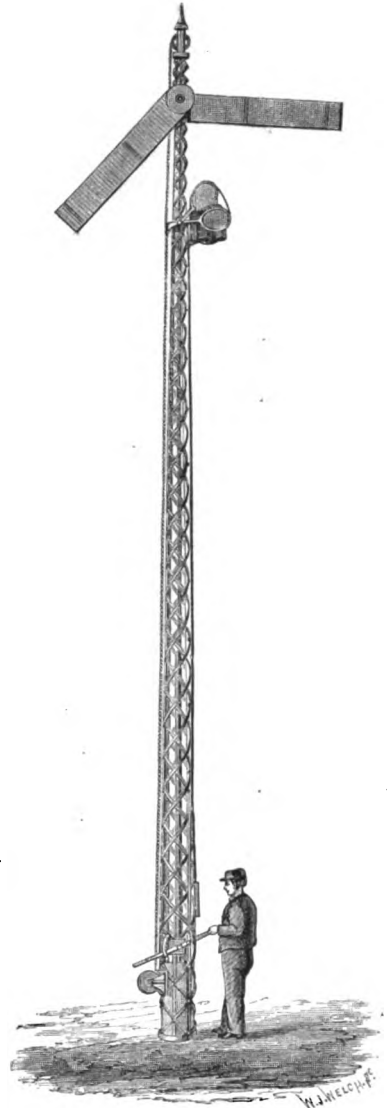
	35 Feet.			40 Feet.			50 Feet.			60 Feet.		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
Wood Posts	32	0	0	37	0	0	42	0	0	48	0	0
Wrought-Iron Posts	36	0	0	42	0	0	47	0	0	54	0	0

Extra Arms and Lamps on the same Post, price £6 10s.

Distant Signal Posts, with one Arm and Lamp, all Gear, and 600 yards Galvanized Wire, with a proportion of Straight Pulleys and Angle Pulleys, and one large Ground Pulley, complete, price £40 with Iron Post, and £38 with Wood Post.

Iron Stakes to carry the Pulleys, price £6 extra per signal.

Wood Stakes ditto price £2 10s. „ „

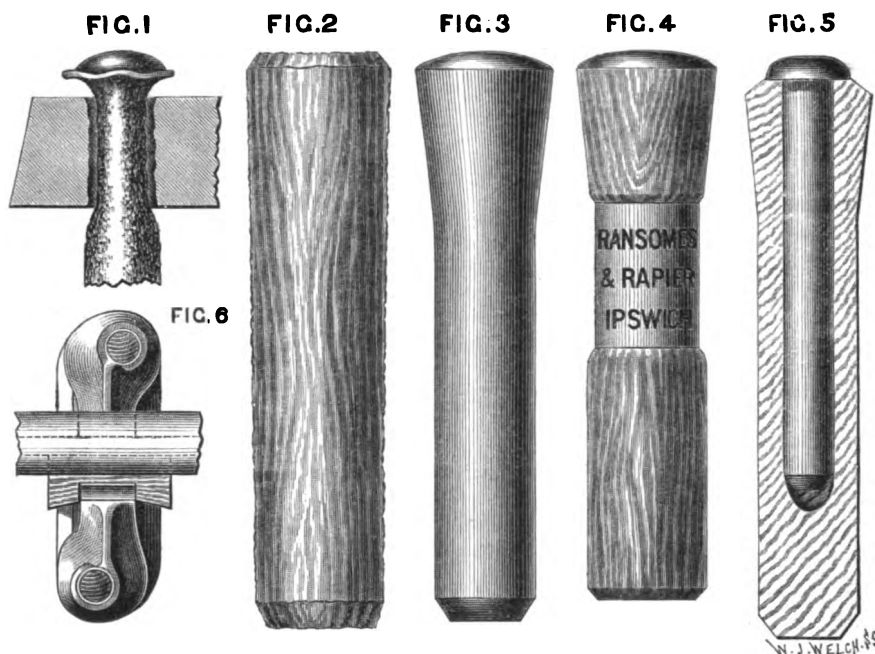


All Woodcuts are from Photographs of work executed by Ransomes & Rapier.

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KEYS AND TRENAILS.



Woodcut Fig. 1 shows the effect of rain and motion on Spike Fastenings, and their consequent untrustworthiness.

Figs. 2, 3, 4 show the superior Wood Trenails which have been almost universally used on the principal English Railways for 34 years (since 1841).

Fig. 2 shows the piece of fine straight-grained Oak (selected by special machinery) before compression.

Fig. 3 shows the size and appearance of the Trenail after compression.

Fig. 4 shows a Trenail which has had a clip put round part of it, and has then been steamed to allow the other parts to re-expand to the former dimensions, and shows how tightly the Trenail grips the sleeper after being driven. Besides increasing the strength, compression multiplies the durability of the Trenail fourfold.

PRICE OF BEST COMPRESSED OAK TRENAILS, £4 PER THOUSAND.

Fig. 5 shows the improved form of Compound Trenails, which combines all the advantages of the holding power of the Trenail, with the additional transverse strength given by the insertion of an iron spike. This is the most perfect form of fastening.

PRICE OF THE BORED TRENAILS, £4 5s. PER THOUSAND.

Fig. 6 shows the Patent Compressed Wood Keys, which after being driven swell again slightly, and so do not become loose.

PRICE OF COMPRESSED KEYS: FIR, £4 10s.; ELM, £5 10s.; OAK, £6 10s. PER THOUSAND.

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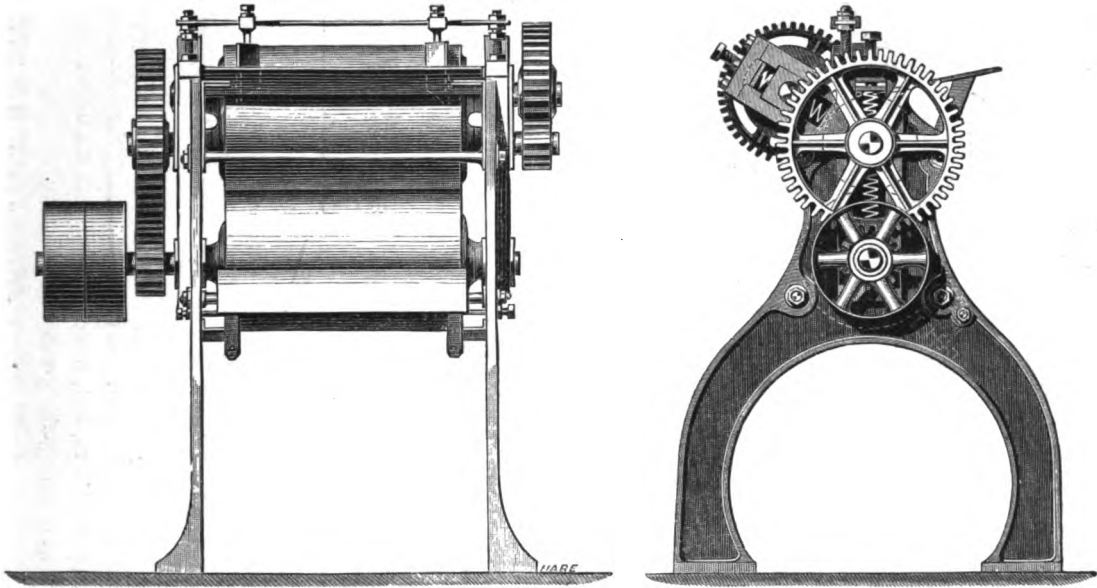
Manufacturers of
SUGAR MACHINERY of all kinds.
Paint " "
White Lead " "
Malt Roasting " "
Confectioners " "
ANIMAL CHARCOAL " "
Gelatine " "
Brewers' " "
Hoisting " "
ENGINES of all descriptions.
Boilers " "
PUMPS, Hot and Cold Liquors.
" for Air.
PANS, VACUUM and open.
" Pneumatic.
Bag Filters.
Charcoal ditto.
Scum Presses.
Presses, Hydraulic or Hand.

ESTABD.  1829.
PATENTEES,
BRINJES AND GOODWIN,
ENGINEERS,
Millwrights and Ironfounders,
WHITECHAPEL ENGINE-WORKS,
FIELDGATE STREET,
LONDON, E.

Manufacturers of
MILLS for Crushing Sugar Cane.
" Grinding Bones.
" Grain Charcoal.
" Paint, Lead, &c.
" Meat, Fish, &c.
Hydro Extractors, or Centrifugal Machines.
STEAM and HAND Cranes, Jibs, and Lifts.
Jacob's Ladders for Raising Grain,
Sugars, &c.
Orange-Cutting Machines for Marmalade.
Vegetable " for Pickles.
MACHINES for preparing Potted Meats.
Preserving Pans, Steam Jacketed.
Tanks in Iron, Copper, Lead, &c.
Condense Water Boxes.
Gun-Metal and Iron Steam Valves and
Fittings.
PIPES, Wrought-Iron, Cast, or Copper.
Castings in Iron or Gun Metal, &c.

IMPROVED GRANITE ROLLER MILL,

FOR GRINDING PAINTS, LEAD, ZINC, INK, &c.



This Mill is superior in every way to the ordinary Millstones. Will grind a much larger quantity, and much finer; requires less power to drive, and is more easily cleansed.

PRICE OF MILL { capable of grinding about 75 cwt. per day, and occupying } £47 10s.
a space of 2 ft. 9 in. x 2 ft. 8 in. x 3 ft. 10 in. high

BRINJES AND GOODWIN also manufacture a specially-designed PUG MILL, or MIXER, which can be worked in direct connection with the above Mill, thus greatly economizing labour.

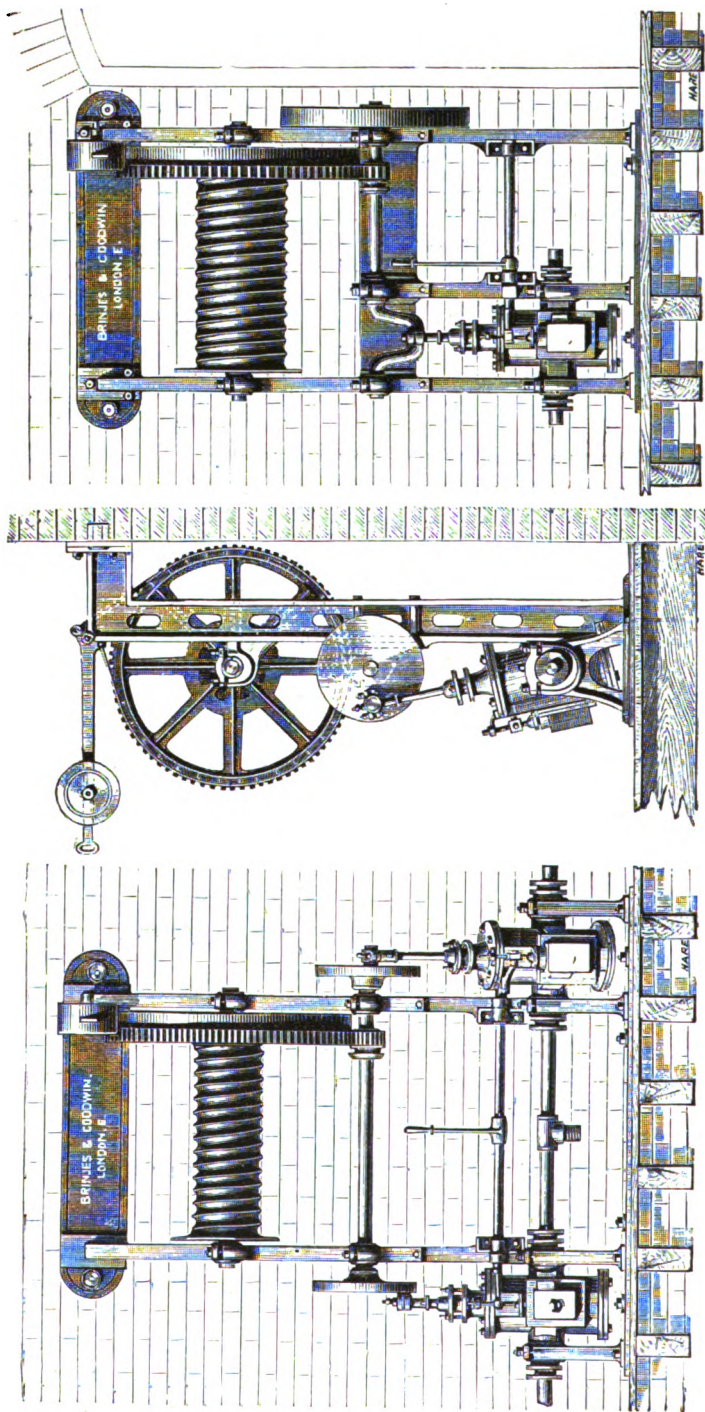
Further particulars on application.

BRINJES AND GOODWIN,

FIELDGATE STREET, LONDON, E.

IMPROVED STEAM HOISTS, LIFTS, AND CRANES,

FOR WAREHOUSES, WHARVES, DOCKS, BREWERIES, SUGAR REFINERIES, HOTELS, &c.



The Hoists are made with Double or Single Cylinders, as shown above. They are applicable to every kind of Lift where Steam Power is required. They can be fixed for working either a JIB CRANE, PLATFORM LIFT, or HOIST, and can be placed in any part of a building, and they have the following advantages, viz. :
They can be worked from any floor by a simple arrangement of rods, &c.; can be instantly stopped or reversed; are easily worked; can be kept well under control.

They are also made for very quick Lifts, the Steam Power being applied direct on to the Barrel, speed of same being under control and regulated according to desire, and also embracing the advantages described above.

JIB CRANES, PLATFORM LIFTS, &c., in connection with the above also supplied.

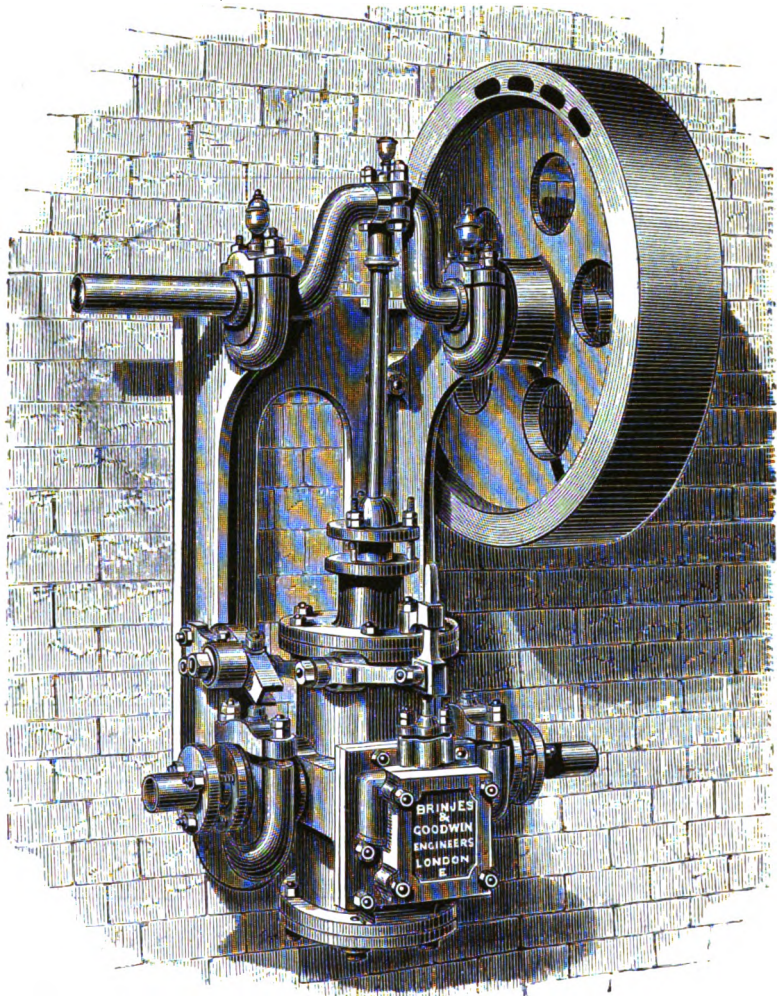
Several already in work giving the greatest satisfaction.

PRICES ON APPLICATION.

BRINJES AND GOODWIN,
 WHITECHAPEL ENGINE-WORKS, FIELDGATE STREET, LONDON, E.

IMPROVED OSCILLATING CYLINDER WALL ENGINE.

These Engines are specially adapted for driving direct for High-Speed Machines, Shafting, Fans, Pumps, and all kinds of Machinery, and offer a great advantage in simplicity of construction, and also the economy of space required for fixing. Each Engine is supplied with a Reversing Gear, so that it can be worked either way. The cost of fixing is reduced to a minimum, as they can be easily secured in any position to existing walls, floors, &c.



PRICES.

A.	Diameter of Cylinder	4 inches	..	..	..	..	..	..	£35
B.	"	" 6 "	..	..	..	..	..	..	50
C.	"	" 8 "	..	..	..	..	..	..	70

Larger sizes on application.

BOILERS, SUITABLE FOR THE ABOVE ENGINES, IF REQUIRED.

A.	With Fittings, complete	..	..	..	..	..	..	..	£30
B.	"	"	..	..	..	..	..	..	47
C.	"	"	..	..	..	..	..	..	84

BRINJES AND GOODWIN are also Makers of all kinds of Stationary High-Pressure ENGINES, and have had considerable experience in the Manufacture of BEAM ENGINES.

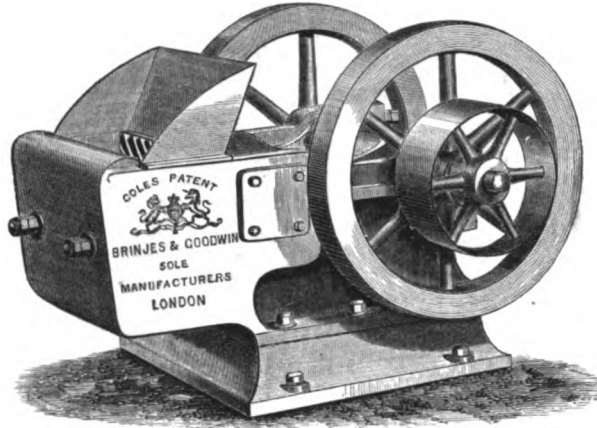
BRINJES AND GOODWIN,
WHITECHAPEL ENGINE-WORKS, FIELDGATE STREET, LONDON, E.

2 K 2

**IMPROVED
CRUSHING AND GRINDING MACHINES,**

SPECIALLY ADAPTED

FOR REDUCING GRANITE, FLINT, CEMENT, MINERALS, ORES, AND CHEMICALS
TO A GIVEN SIZE, OR, IF REQUIRED, TO IMPALPABLE POWDER.



COLE'S PATENT STONE BREAKERS,

ACKNOWLEDGED TO BE

THE MOST EFFICIENT, SIMPLE, PORTABLE, AND CHEAPEST YET USED,

BESIDES

CONSUMING THE LEAST AMOUNT OF ENGINE POWER.

Prices for Stone Breakers.

No. 1.	Average Turn-out per day about 30 Tons (5 H.-P.)	£95 Nett, delivered in London.
2.	" " " " 60 " (8 H.-P.)	£175 " "

ALSO MANUFACTURERS OF

PATENT COMPOUND-ACTION MACHINES,

FOR REDUCING CEMENT, &c., TO POWDER

WITH COLE'S PATENT EVERLASTING GRINDING DISCS.

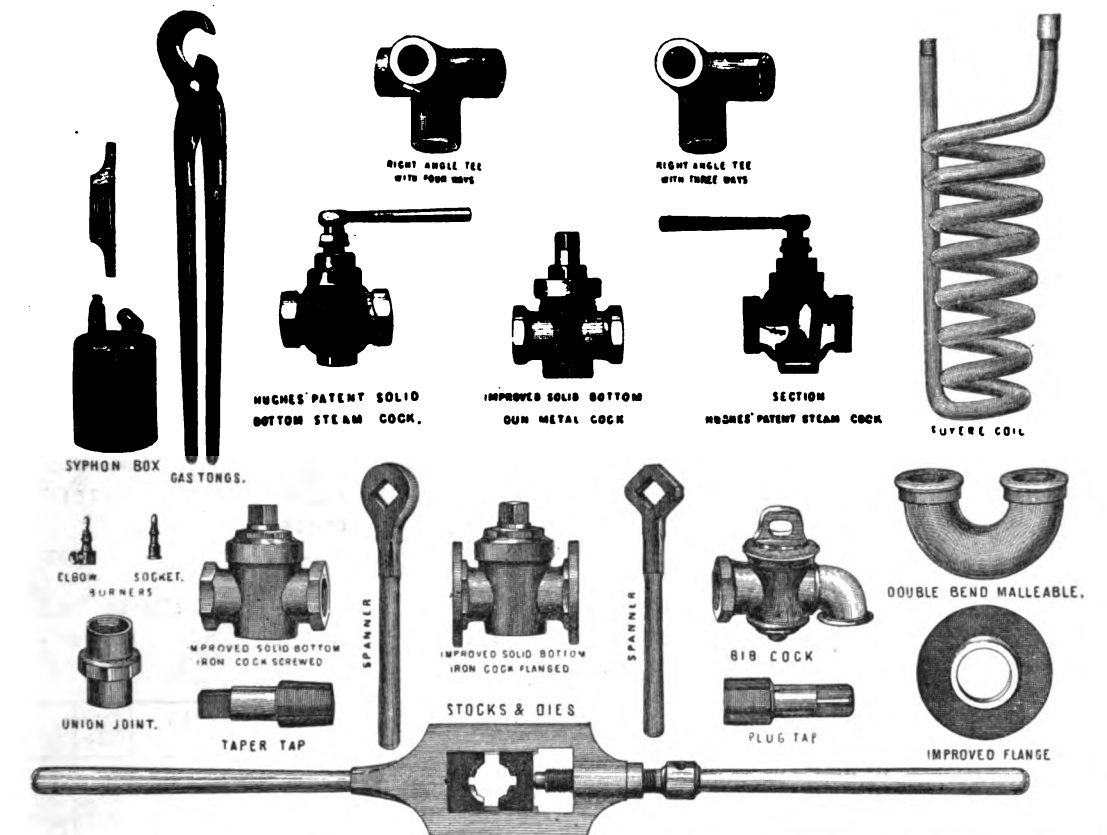
FOR FURTHER PARTICULARS APPLY TO

BRINJES AND GOODWIN, Sole Manufacturers,

WHITECHAPEL ENGINE-WORKS, FIELDGATE STREET, LONDON, E.;

Or to the Patentee, J. C. COLE, 266, Strand, W.C.

NET LIST OF PRICES.



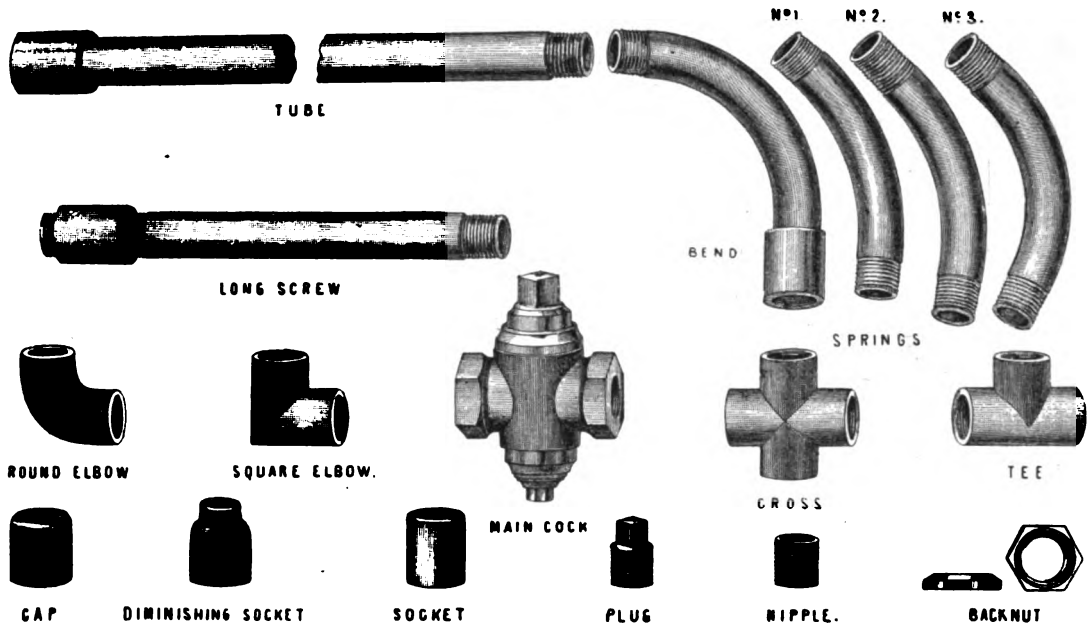
SCREWING STOCKS, TAPS, DIES, &c. QUALITY WARRANTED.	Inches	No. 1 Set.			No. 2 Set.			No. 3 Set.			No. 4 Set.		
		3	2½	2¼	2	1½	1¼	1	¾	½	¾	½	¼
Stocks, with 3 pairs each Taps & Dies per set		260/-			120/-			52/6			32/6		
Dies	per pair	25 0	20 0	17 0	14 0	9 0	7 6	6 6	5 6	4 6	4 0	3 6	3 6
Hobs or Master Taps	each	45 0	33 0	25 0	16 0	8 6	7 0	6 6	5 6	4 6	4 0	3 6	3 6
Taps	per pair	80 0	60 0	45 0	32 0	17 6	12 6	10 0	8 0	6 6	5 6	4 6	4 0
Tap Wrenches	each	47/-			25/-			12/6			7/6		
Rymers, Hexagon or Octagon	"	37 6	30 0	23 0	15 0	8 0	6 0	4 6	3 6	3 0	2 3	1 9	1 6
Stocks, Taps, and Dies, for ⅜, ½, and ⅝ in.		20/- per Set complete. Without Taps, 12/- per Set.											
Copper Tube													

SUNDRIES.	Inches	3	2½	2¼	2	1½	1¼	1	¾	½	¾	½	¼
		s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Cocks, Improved Solid Bottom, Gun Metal each		115 0	98 6	80 6	62 0	36 6	32 0	20 0	14 6	9 9	6 4	4 7	3 6
Cocks, Improved Solid Bottom, Iron Round Way	If with Bibs or Flanges 10% extra.	56 0	50 0	44 0	30 0	18 0	14 0	10 6	8 0	6 0			
Ditto, with Gun-Metal Plugs		96 0	84 0	68 0	48 0	34 0	29 0	22 0	15 6	10 6			
Spanners for Cocks		2 9	2 6	2 3	2 0	1 9	1 6	1 4	1 10	11 0	0 9	0 8	0 7
Brass Unions		36 3	30 0	22 6	17 3	14 6	11 6	8 6	6 4	4 8	3 6	2 0	1 9
Elbow Burners	per gross												
Socket Burners													
Pipe Tongs or Nippers	per pair	10 6	9 6	8 7	7 0	5 6	5 0	4 8	3 8	3 2	2 7	2 4	1 11
Socket Tongs or Nippers	"	12 0	10 3	9 4	8 6	6 10	5 8	5 0	4 6	3 7	3 1	2 7	2 3
Two-hole Pliers	per pair	2 0	to	3 0									
Malleable Double Bends	each	16 6	12 3	8 0	6 3	4 6	4 0	3 6	2 3	1 5	1 2	1 1	
Gas Hooks	per gross	19 6	16 0	12 6	9 9	6 10	6 4	5 9	4 7	3 8	3 0	2 0	1 8

Hydraulic Press Tubes, proved to 4000 lb. per square inch, 4d. to 6d. per lb. Gas Burners, best make, 5s. per gross.
 Founders' Core Bars, plain, 4d. to 6d. per lb.; Drilled or Tapered, 1d. per lb. extra; Tapered or Drilled, 1d. per lb. extra.
 Flush-Jointed Boring Tubes. Steam Boiler Fittings, Gauges, &c.
 Three and Four Way Cocks. Glass Blowers' Tubes, &c., &c.

THE BIRMINGHAM PATENT IRON AND BRASS TUBE COMPANY,
 SMETHWICK, NEAR BIRMINGHAM. LONDON OFFICE: 77, CANNON STREET, E.C.

PRICES OF WROUGHT-IRON TUBES AND FITTINGS.



TUBES.

Internal Diameter in Inches ..	4	3½	3	2¾	2½	2¼	2	1¾	1½	1¼	1	¾	½	¼	⅓	⅔
Tubes assorted, from 2 to 14 feet, per foot	7/0	5/6	4/6	4/0	3/3	2/6	1/9	1/6	1/2	0/11	0/8	0/6	0/4½	0/3½	0/3	0/2½
Pieces from 12 to 23 inches each ..	14/6	11/6	9/0	7/6	6/3	4/6	3/0	2/6	2/0	1/8	1/4	1/0	0/9	0/7	0/5	0/4
Ditto from 3 to 11 ditto ..	9/0	8/0	7/0	6/0	4/9	4/0	2/3	2/0	1/4	1/1	0/11	0/8	0/6	0/4	0/3	0/2
Longscrews, from 12 to 23½ in. ..	15/6	12/6	10/0	8/6	7/0	5/6	4/0	3/3	2/6	2/0	1/6	1/2	0/11	0/9	0/7	0/5
Ditto 3 to 11 do. ..	10/0	8/6	7/6	6/6	5/6	4/6	3/0	2/6	2/0	1/3	1/0	0/10	0/8	0/6	0/5	0/4
Bends and Lamp Bends	32/6	25/0	16/0	12/0	10/0	6/6	4/3	3/3	2/3	1/9	1/3	0/11	0/8	0/7	0/6½	0/5½
Springs, various elevations	26/0	19/0	12/0	10/0	7/6	5/6	3/3	2/6	1/8	1/4	0/11	0/9	0/7	0/6	0/5	0/4

FITTINGS.

Square Elbows, equal or reducing ..	28/0	22/0	14/0	11/0	8/6	5/6	3/6	3/0	2/3	1/9	1/2	0/10	0/8	0/7	0/6½	0/6
Round Elbows	32/0	25/0	16/0	13/0	10/0	6/6	3/10	3/4	2/6	1/11	1/4	1/0	0/9	0/8	0/7	0/7
Tees, equal or reducing	30/0	24/0	16/6	12/6	9/6	6/0	3/9	3/0	2/6	1/9	1/3	1/0	0/9	0/7	0/6½	0/6
Crosses, ditto	50/0	42/0	30/0	21/0	16/0	10/6	5/3	4/6	3/6	3/0	2/3	1/9	1/5	1/0	1/0	0/10
Sockets, reducing	9/0	7/0	5/0	4/0	3/0	2/0	1/3	1/1	0/11	0/9	0/7	0/6	0/5	0/4	0/3	..
Caps and Plugs	10/0	7/0	4/9	3/6	2/6	2/0	1/3	1/0	0/10	0/8	0/6	0/5	0/4	0/3	0/3	0/2
Nipples and Backnuts	5/6	4/6	3/6	3/0	2/3	1/9	1/0	0/10	0/8	0/6	0/4	0/3½	0/3	0/2	0/2	0/1
Sockets, plain	6/0	5/0	3/6	3/0	2/6	1/6	1/0	0/9	0/7	0/6	0/4	0/3½	0/3	0/2	0/1½	0/1½
Flanges	11/6	10/0	8/6	6/9	5/0	3/9	2/6	2/0	1/9	1/6	1/4	1/2	1/0	0/10	0/9	0/8
Iron Main Cocks	90/0	75/0	50/0	44/0	36/0	27/0	18/0	14/0	11/0	8/6	6/6	4/6	3/6	2/9	2/3	2/3
Ditto with Brass Plugs ..	190/0	140/0	110/0	90/0	60/0	47/0	32/0	25/0	19/6	15/0	10/6	7/6	5/6	4/6	..	..
Ditto Round Way	160/0	100/0	70/0	62/0	54/0	38/0	22/0	17/6	13/0	10/0	7/6	5/6	4/0	3/6	..	..
Ditto ditto with Brass Plugs	280/0	180/0	120/0	105/0	85/0	60/0	42/0	36/0	28/0	19/0	13/0	9/0	6/6	5/0	..	..
Syphon Boxes, 1 quart	..	..	..	..	..	18/0	16/0	15/6	15/0	14/0	13/0	12/0	11/0	..	..	..
Ditto 2 quarts	..	..	40/0	35/0	30/0	25/0	23/0	21/0	19/0	18/0	17/0	16/0	..	..	..	..
Ditto 3	56/0	50/0	45/0	40/0	35/0	32/0	28/0	26/6	25/0	24/0	22/0	20/0	..	..	..	..
Ditto 4	60/0	54/0	47/0	42/0	38/0	34/0	31/0	29/0	27/0	25/0	23/0	21/0	..	..	..	..

Intermediate sizes charged at the next higher rates. Tees, Crosses, &c., with additional outlets, to order.

N.B.—The above Prices are subject to discounts varying with the price of Iron.

THE BIRMINGHAM PATENT IRON AND BRASS TUBE COMPANY,
SMETHWICK, NEAR BIRMINGHAM. **LONDON OFFICE: 77, CANNON STREET, E.C.**

Patent Lap-Welded Iron Tubes for Locomotive and Marine Boilers.

FIRST-CLASS MEDAL,
LONDON, 1851.

ESTABLISHED 1840.

PARIS MEDALS,
1855 & 1867.

PRICES PER FOOT OF LAP-WELDED IRON BOILER TUBES.

External Diameter in Inches	1 1/4	1 1/2	1 3/4	2	2 1/4	2 1/2	2 3/4	3	3 1/4	3 1/2	3 3/4	4	4 1/4	4 1/2	4 3/4	5	5 1/4	5 1/2	6	6 1/4	6 1/2	7	7 1/4	8
Usual B.W.G.	14	13	13	12	12	12	11	11	11	10	10	9	9	8	8	8	8	7	7	7	7	7	7	5
Price per foot of usual B.W.G.	9 1/4d	9 3/4d	10d	10 1/4d	11d	11 1/4d	11 1/2d	11 3/4d	12 1/4d	12 1/2d	12 3/4d	13 1/4d	13 1/2d	13 3/4d	14 1/4d	14 1/2d	14 3/4d	15 1/4d	15 1/2d	15 3/4d	16 1/4d	16 1/2d	16 3/4d	17 1/4d
Ditto 1 extra Gauge	10 1/4d	10 1/2d	10 3/4d	11 1/4d	11 1/2d	11 3/4d	12 1/4d	12 1/2d	12 3/4d	13 1/4d	13 1/2d	13 3/4d	14 1/4d	14 1/2d	14 3/4d	15 1/4d	15 1/2d	15 3/4d	16 1/4d	16 1/2d	16 3/4d	17 1/4d	17 1/2d	17 3/4d
Ditto 2 extra Gauges	11 1/4d	11 1/2d	11 3/4d	12 1/4d	12 1/2d	12 3/4d	13 1/4d	13 1/2d	13 3/4d	14 1/4d	14 1/2d	14 3/4d	15 1/4d	15 1/2d	15 3/4d	16 1/4d	16 1/2d	16 3/4d	17 1/4d	17 1/2d	17 3/4d	18 1/4d	18 1/2d	18 3/4d
Ditto 3 extra Gauges	12 1/4d	12 1/2d	12 3/4d	13 1/4d	13 1/2d	13 3/4d	14 1/4d	14 1/2d	14 3/4d	15 1/4d	15 1/2d	15 3/4d	16 1/4d	16 1/2d	16 3/4d	17 1/4d	17 1/2d	17 3/4d	18 1/4d	18 1/2d	18 3/4d	19 1/4d	19 1/2d	19 3/4d
Ditto 3/8 inch Thick	13 1/4d	13 1/2d	13 3/4d	14 1/4d	14 1/2d	14 3/4d	15 1/4d	15 1/2d	15 3/4d	16 1/4d	16 1/2d	16 3/4d	17 1/4d	17 1/2d	17 3/4d	18 1/4d	18 1/2d	18 3/4d	19 1/4d	19 1/2d	19 3/4d	20 1/4d	20 1/2d	20 3/4d
1/2 inch Thick	14 1/4d	14 1/2d	14 3/4d	15 1/4d	15 1/2d	15 3/4d	16 1/4d	16 1/2d	16 3/4d	17 1/4d	17 1/2d	17 3/4d	18 1/4d	18 1/2d	18 3/4d	19 1/4d	19 1/2d	19 3/4d	20 1/4d	20 1/2d	20 3/4d	21 1/4d	21 1/2d	21 3/4d
5/8 inch Thick	15 1/4d	15 1/2d	15 3/4d	16 1/4d	16 1/2d	16 3/4d	17 1/4d	17 1/2d	17 3/4d	18 1/4d	18 1/2d	18 3/4d	19 1/4d	19 1/2d	19 3/4d	20 1/4d	20 1/2d	20 3/4d	21 1/4d	21 1/2d	21 3/4d	22 1/4d	22 1/2d	22 3/4d
3/4 inch Thick	16 1/4d	16 1/2d	16 3/4d	17 1/4d	17 1/2d	17 3/4d	18 1/4d	18 1/2d	18 3/4d	19 1/4d	19 1/2d	19 3/4d	20 1/4d	20 1/2d	20 3/4d	21 1/4d	21 1/2d	21 3/4d	22 1/4d	22 1/2d	22 3/4d	23 1/4d	23 1/2d	23 3/4d
7/8 inch Thick	17 1/4d	17 1/2d	17 3/4d	18 1/4d	18 1/2d	18 3/4d	19 1/4d	19 1/2d	19 3/4d	20 1/4d	20 1/2d	20 3/4d	21 1/4d	21 1/2d	21 3/4d	22 1/4d	22 1/2d	22 3/4d	23 1/4d	23 1/2d	23 3/4d	24 1/4d	24 1/2d	24 3/4d
1 inch Thick	18 1/4d	18 1/2d	18 3/4d	19 1/4d	19 1/2d	19 3/4d	20 1/4d	20 1/2d	20 3/4d	21 1/4d	21 1/2d	21 3/4d	22 1/4d	22 1/2d	22 3/4d	23 1/4d	23 1/2d	23 3/4d	24 1/4d	24 1/2d	24 3/4d	25 1/4d	25 1/2d	25 3/4d

Tubes of intermediate diameter to be charged at the same price as the next larger size. Stays of intermediate thicknesses to be charged at the next thicker size. Extreme lengths at special prices. No extra charge for Tubes swelled 1 1/4 th of an inch at one end and three inches up. Extra swelling will be charged 12s. per 100 ends, gross, per 1 1/4 th up to 4 inches diameter.

PRICES PER FOOT FOR IRON TUBULAR SCREWED STAYS, INCLUSIVE OF 11 INCHES OF SCREWING.

External Diameter in Inches	2	2 1/4	2 1/2	2 3/4	3	3 1/4	3 1/2	3 3/4	4	4 1/4	4 1/2	4 3/4	5
1/2 inch Thick	2/2	2/3	2/4	2/5	2/6	2/7	2/8	2/9	2/10	2/11	2/12	2/13	2/14
3/4 inch Thick	2/6	2/7	2/8	2/9	2/10	2/11	2/12	2/13	2/14	2/15	2/16	2/17	2/18
5/8 inch Thick	3/4	3/7	3/10	3/12	3/14	3/16	3/18	3/20	3/22	3/24	3/26	3/28	3/30

PRICES OF STAY BACKNUTS, AND SCREWING STAYS, BEYOND 11 INCHES.

External Diameter of Stays in Inches	2	2 1/4	2 1/2	2 3/4	3	3 1/4	3 1/2	3 3/4	4	4 1/4	4 1/2	4 3/4	5
Screwed Nuts each	1/0	1/0	1/2	3/8	1/5	1/6	1/6	2/8	3/5	3/9	4/2	4/8	5/3
Screwing Stays per lineal inch	1 1/4d	1 1/4d	2d	2 1/4d	2 1/2d	2 3/4d	3d	3 1/4d	3 1/2d	3 3/4d	4d	4 1/4d	4 1/2d

Prices of Tubes of larger sizes than 8 inches on application.

THE BIRMINGHAM PATENT IRON AND BRASS TUBE COMPANY,

SMETHWICK, NEAR BIRMINGHAM.

LONDON OFFICE: 77, CANNON STREET, E.C.

LIST OF PRICES.

BRASS BOILER TUBES.

BRASS LOCOMOTIVE AND MARINE SOLID DRAWN OR BRAZED BOILER TUBES, } at	per lb.
from 4 to $1\frac{5}{8}$ in. external diameter, to 14 B.W.G.	
Below $1\frac{1}{2}$ in. to $1\frac{1}{4}$ in. external diameter, inclusive, to 14 B.W.G.	at per lb.
$\frac{1}{2}$ d. per lb. extra for each Gauge thinner.	

BRASS CONDENSER TUBES.

SOLID DRAWN BRASS SURFACE CONDENSER TUBES, $1\frac{1}{4}$ to $\frac{3}{4}$ in. external diameter, inclusive, to 19 B.W.G., not exceeding 12 feet in length ..	} at	per lb.
Below $\frac{3}{4}$ to $\frac{5}{8}$ in. inclusive, to 19 B.W.G. " " " " ..	at	per lb.
Below $\frac{5}{8}$ to $\frac{1}{2}$ in. inclusive, to 20 B.W.G. " " " " ..	at	per lb.
$\frac{1}{2}$ d. per lb. extra for each Gauge thinner. $\frac{1}{2}$ d. per lb. extra over 12 feet. Tinning, 2d. per lb. extra.		

COPPER CONDENSER TUBES.

SOLID DRAWN COPPER CONDENSER TUBES, $1\frac{1}{4}$ to $\frac{3}{4}$ in. external diameter, inclusive, to 19 B.W.G., not exceeding 12 feet in length ..	} at	per lb.
Below $\frac{3}{4}$ to $\frac{5}{8}$ in. inclusive, to 19 B.W.G., not exceeding 12 feet in length ..	at	per lb.
Below $\frac{5}{8}$ to $\frac{1}{2}$ in. inclusive, to 20 B.W.G. " " " " ..	at	per lb.
1d. per lb. extra for each Gauge thinner.		

CONDENSER TUBE PLATES.

BRASS CONDENSER PLATES, RECTANGULAR ..	at	per lb.
" " " CIRCULAR ..	at	per lb.

BRAZED COPPER TUBES AND PIPES.

Above $\frac{5}{8}$ in. to 3 in. diameter outside, not thinner than 15 B.W.G. ..	at	per lb.
" 3 in. to 4 in. " " " 12 B.W.G. ..	at	per lb.
" 4 in. to $4\frac{1}{2}$ in. " " " 12 B.W.G. ..	at	per lb.
" $4\frac{1}{2}$ in. to 8 in. " " " 12 B.W.G. ..	at	per lb.
$\frac{1}{2}$ d. per lb. extra for each Gauge thinner.		

SOLID DRAWN COPPER TUBES.

$\frac{3}{8}$ to $\frac{1}{2}$ in. outside, to No. 14 B.W.G. ..	at	per lb.
Above $\frac{1}{2}$ in. to 1 in. inclusive, to No. 14 B.W.G. ..	at	per lb.
" 1 in. to $1\frac{1}{2}$ in. " " " " ..	at	per lb.
" $1\frac{1}{2}$ in. to $1\frac{3}{4}$ in. inclusive, to 14 B.W.G. ..	at	per lb.
" $1\frac{3}{4}$ in. to $3\frac{1}{2}$ in. " 14 B.W.G. ..	at	per lb.
" $3\frac{1}{2}$ in. to $4\frac{1}{2}$ in. " 12 B.W.G. ..	at	per lb.
1d. per lb. extra for each Gauge thinner.		

Copper Tubes and Pipes bent to plan, and Engineers' Coppersmith work to order.

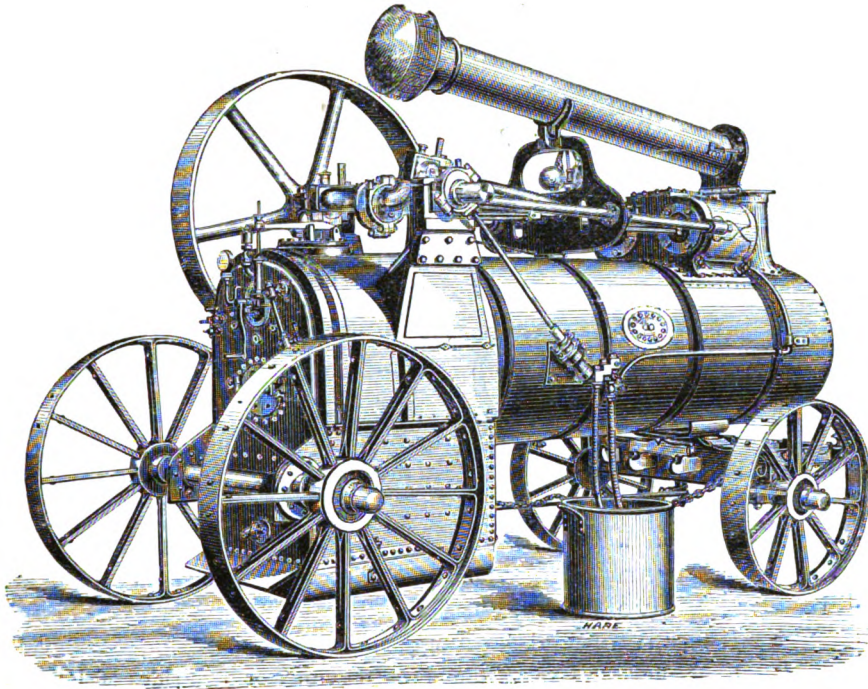
LISTS FOR BRASS AND COPPER SHEETS, WIRE, &C., ON APPLICATION.

First-Class Medal, London, 1851. Paris Medals, 1855 and 1867.

N.B.—Prices vary according to prices of Copper and Spelter.

THE BIRMINGHAM PATENT IRON AND BRASS TUBE COMPANY,
SMETHWICK, NEAR BIRMINGHAM. LONDON OFFICE: 77, CANNON STREET, E.C.

PATENT PORTABLE STEAM-ENGINES.



During the past few years the use of Portable Engines has largely extended, and they are now extensively employed in mining and manufacturing operations of a varied character. The rapid development of this branch of Engineering has increased the demand for Portable Engines of larger power, and it has thus been found desirable to introduce a new design for such Engines which should embody greater strength and rigidity in the working parts, as well as reduce the strain on the Boilers.

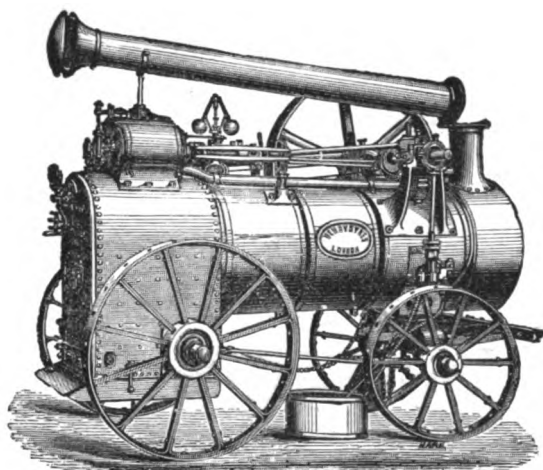
From the Illustration of the Patent Portable Engine it will be seen that the Boiler is flush throughout, and is lagged and cased the whole length, wrought-iron horn plates are riveted to the sides of the fire box, on the tops of which are bolted dovetailed castings for receiving the Crank Shaft carriages which slide in these dovetails. The Cylinders are steam jacketed, and are cast in one piece with the Valve Chest; they are mounted on the Boiler at the smoke-box end, and are arranged with a flange all round the base, which enables them to be secured in their place in the stiffest manner possible; strong lugs are cast on the front end of the Cylinders, to which are attached wrought-iron tubular stays for connecting same to the carriages of the Crank Shaft, thus both the Cylinders and Crank Shaft are rigidly maintained in their respective positions, and the strain on the Boiler by the working of the Engine is reduced to a minimum; further, it is quite free to expand and contract without affecting the positions of the Cylinders and Crank Shaft. A wrought-iron bridge plate is provided for receiving the governors, chimney stand, one end of the slide bars and the valve rods, and same is supported by the tubular stays above mentioned. By this arrangement the bolt connections to the boiler are reduced to two, viz. the Cylinders and the Force Pump.

These Engines are constructed from 14 to 30 Horse-power inclusive, they are of extra strength throughout, and may be worked at a high pressure; they are fitted with Patent Variable Expansion Apparatus, efficient Feed-Water Heater, and all the improvements embodied in the smaller Engines, and will be found most efficient and durable in working.

HENRY SYKES, 66, BANKSIDE, LONDON, S.E.

Any Engine, Pump, Hand or Steam Crane, Hoist, Winding Engine, Mortar Mill, or other Machinery in Stock may be had ON HIRE.

PORTABLE ENGINES.



These Engines are of the best material and first-class workmanship throughout, being equal in finish to the best Locomotive work.

They are unsurpassed for efficiency, strength, and durability in working, and embody the following important advantages and improvements:

- 1—Great Economy in Fuel. The Cylinders are Steam Jacketed, an efficient Feed-Water Heater is applied in connection with the Exhaust, heating the feed water to a high temperature, and every Engine is fitted with Patent Variable Expansion Eccentric.
- 2—Large Cylinder area. They are Steam Jacketed and are cast in one piece with the valve chest. They are made of a special mixture of the best iron, thus ensuring great durability in the internal wearing surfaces.
- 3—Proportionate Boiler capacity.
- 4—Extra strength of all the parts.
- 5—Simplicity of arrangement and ease of access to all internal details.
- 6—Steel Piston, Valve Rods, and Slidebars.
- 7—All Lubricator Boxes worked out of the solid material.
- 8—Crank Shaft, arranged to give off the power on either or both sides of Engine at once, is supported on a Saddle Casting, taking a large bearing on the Boiler.
- 9—Efficient Continuous Vertical Force Pump, certain in action and not liable to derangement.
- 10—Simple Reversing Motion, by means of which the Engine can be readily worked in either direction.
- 11—Improved Wrought-Iron Wheels, which for hot climates especially are most advantageous. Great care has been bestowed in their design and special machinery put down for their manufacture. They embody the greatest possible strength of construction and will be found practically indestructible.
- 12—Great Durability, owing to strength of parts and the large wearing surface provided in all the Brasses and Bearings.
- 13—Complete Equipment. Each Engine is fitted with second Lock-up Safety Valve, Pressure Gauge, and Steam Whistle, inclusive in the List price.
- 14—Every Engine is thoroughly tested under steam at a high pressure before leaving the Works, and is sent out with a complete set of Spanners, Firing Tools, Funnel, Tube Brush, Oil Feeder, and Waterproof Cover, and is furnished with Check Chains, Lock Chains, and Shoe.

A large number of these Engines in Stock for *Hire* to be had at once for temporary or general purposes. The Hirer may depend upon having an efficient Engine, as great care is taken after each is returned to have it overhauled and tested under steam before going out again.

Also Centrifugal, Barrel, Chain, and various other Pumps to be had at a few hours' notice.

BOOKS OF INSTRUCTION, WITH FULL PARTICULARS FOR THE MANAGEMENT OF PORTABLE ENGINES, ARE SUPPLIED WITH EVERY ENGINE.

HENRY SYKES, 66, BANKSIDE, LONDON, S.E.

Any Engine, Pump, Hand and Steam Crane, Hoist, Winding Engine, Mortar Mill, or other Machinery in Stock may be had ON HIRE.

Price of Portable Steam-Engines.

WITH ONE CYLINDER.

Horse-power.	Diameter of Cylinder in Inches.	Length of Stroke in Inches.	Speed in Revolutions per Minute.	Weight without Case in Cwts.	Weight with Case in Cwts.	Measurement in Cubic Feet.	Price.		
2½	5½	8	180	34	40	115	£	s.	d.
3	6¼	8	180	42	49	208	125	0	0
4	6¾	10	150	51	59	256	150	0	0
5	7¾	12	125	64	74	285	180	0	0
6	8½	12	125	72	84	334	200	0	0
7	8¾	12	125	75	86	349	220	0	0
8	9½	12	125	81	93	390	235	0	0
9	10½	12	125	90	103	443	255	0	0
10	10½	14	110	105	119	457	275	0	0
12	12	14	110	114	129	501	295	0	0
							335	0	0

WITH TWO CYLINDERS.

Horse-power.	Diameter of Cylinder in Inches.	Length of Stroke in Inches.	Speed in Revolutions per Minute.	Weight without Case in Cwts.	Weight with Case in Cwts.	Measurement in Cubic Feet.	Price.		
	EACH.						£	s.	d.
8	6¾	12	125	87	99	390	285	0	0
9	7	12	125	92	105	409	300	0	0
10	7¾	12	125	104	117	423	320	0	0
12	8½	12	125	108	123	465	370	0	0
14	8¾	12	125	125	138	472	415	0	0
16	9½	14	110	148	163	491	455	0	0
18	10	16	95	198	216	570	510	0	0
20	10½	16	95	213	235	630	545	0	0
25	12	16	95	233	255	710	660	0	0
30	13	16	95	274	297	790	780	0	0

These Engines are constructed with enlarged internal Fire Boxes for burning wood and refuse as fuel, at an additional charge on the price specified in List.

Packing for Export, in strong framed case closely boarded and wheels hay-banded, 20s. per Horse-power.

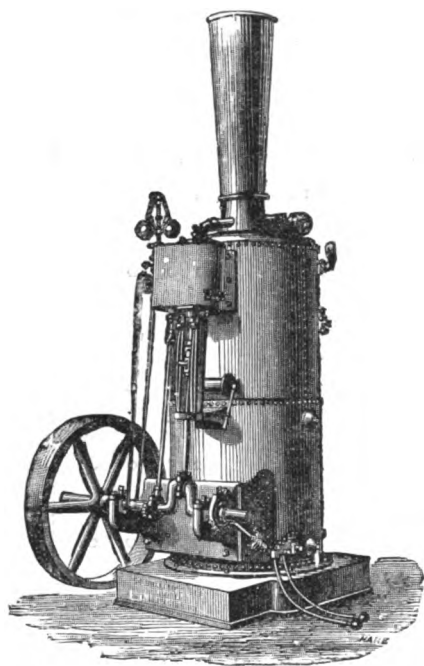
STEAM JET VALVES, very useful for creating a draught and raising Steam quickly, extra £1 5 0

LINK-MOTION REVERSING GEAR, extra, according to the size of the Engine, from £15 to 25 0 0

HENRY SYKES, 66, BANKSIDE, LONDON, S.E.

Any Engine, Pump, Hand or Steam Crane, Hoist, Winding Engine, Mortar Mill, or other Machinery in Stock may be had ON HIRE.

VERTICAL STATIONARY STEAM-ENGINE.



THE CYLINDER AREA AND BOILER CAPACITY are very large for the respective nominal powers. The attention of purchasers is particularly requested to these points, which are of the greatest importance in comparing the relative capabilities and prices of these Engines with those of other Makers.

THE CYLINDERS ARE STEAM JACKETED in Engines of 4 H.-P. and above.

REVERSING MOTION is attached to the Slide Valve Eccentrics, by means of which the Engines may be readily altered to run in either direction to suit the work.

GOVERNORS are direct acting, simple, and efficient.

CRANK SHAFTS, of the Locomotive form (enabling the Power to be given off on either or both sides at once), are supported in a substantial Fixing, which receives both ends of Crank Shaft. A strong Wrought-Iron Plate is riveted to the Boilers, to which the above Fixing is firmly bolted, entirely independent of the Boiler Barrel.

FORCE PUMPS, which are worked by an Eccentric, and fitted with brass Valve-Boxes and Treble Valves, are also attached to this plate, clear of the Boiler Barrel.

THE BOILERS have cross-section Lowmoor Tubes, are made of extra strength, and are of very large capacity, consequently steam well. Each is fitted with two Safety Valves, Pressure Gauge, Water Gauge, Gauge Cocks, and Blow-off Cock complete, and is supported upon a *Strong Base Plate*, forming an Ashpan, which is fitted with a regulator for the draught.

I have always a number of these Engines in course of construction at my Works in London, as well as others ready for delivery.

These Engines are fitted when required with Link-Motion Reversing Gear, Winding Gear, Chain Wheels, &c., suitable for hoisting and unloading cargoes, ship's use, &c.

Every Engine is thoroughly tested under steam prior to leaving the Works, and is provided with a set of Spanners, Firing Tools, Oil Can, and spare Gauge Glasses.

The Engines are all made to template and gauge throughout, so that purchasers can be supplied with duplicate wearing parts by simply stating the number on the Engine name-plate.

For EXPORTATION, the following duplicate parts are recommended to be sent out :

2 PAIRS MAIN SHAFT BRASSES.

1 SET OF BRASSES TO LARGE END OF
CONNECTING ROD.

1 SET OF PISTON RINGS AND SPRINGS.

1 SET OF FURNACE BARS.

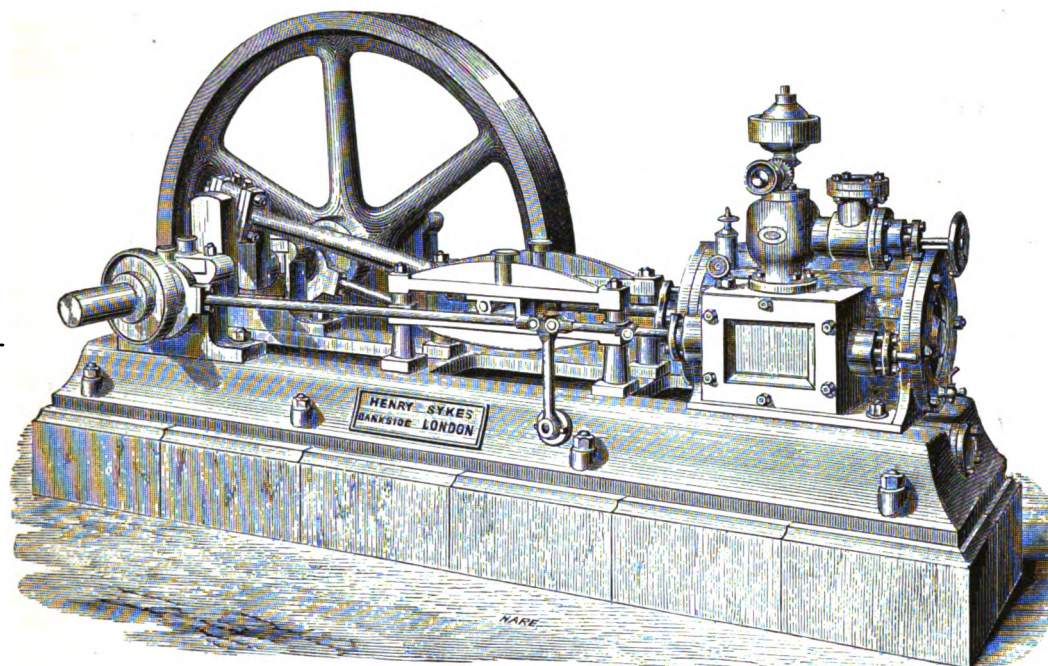
6 GAUGE GLASSES AND WASHERS.

Horse-power.	Diameter of Cylinder in Inches.	Length of Stroke in Inches.	Speed in Revolutions per Minute.	Weight without Case in Cwts.	Weight with Case in Cwts.	Measurement in Cubic Feet.	Price.		
1½	4½	7	215	16½	21	76	£	s.	d.
2½	5½	8	180	25	30	122	75	0	0
3	6½	8	180	33	41	131	100	0	0
4	6½	10	150	42	52	253	110	0	0
5	7½	12	125	54	67	275	130	0	0
6	8½	12	125	63	76	324	155	0	0
7	8½	12	125	82	97	485	175	0	0
8	9½	12	125	86	101	487	200	0	0
9	10	12	125	95	110	520	215	0	0
10	10½	14	110	112	128	597	235	0	0
12	12	14	110	133	152	631	250	0	0
							290	0	0

HENRY SYKES, 66, BANKSIDE, LONDON, S.E.

Any Engine, Pump, Hand or Steam Crane, Hoist, Winding Engine, Mortar Mill, or other Machinery in Stock may be had ON HIRE.

STATIONARY HORIZONTAL STEAM-ENGINES, ON METAL FOUNDATION PLATES.



The Cylinders are of large area for their nominal powers, and with the steam chests, are felted, lagged, and cased.

The Crank Shafts are made of the best scrap iron, and the Carriages for same are fitted with extra long bearings, adjustable both horizontally and vertically.

The Fly Wheels are turned to receive a driving belt, and are accurately counter-weighted.

The Governors are direct acting, and have perfect control over the Engines.

The Force Pumps are each attached to foundation plate, in connection with water heater, and worked by an Eccentric from Crank Shaft.

Water Heaters, on a most efficient principle, are also fixed on the foundation plate, for heating the feed water in its passage from pump to Boiler by means of the exhaust steam.

The following List expresses the nominal or commercial horse-power; the indicated power in these as well as in the Portable Engines would be about three times the power here given, being only accurately expressed in the piston area or diameter of Cylinder, and proportionate strength in the other parts of the Engine.

Cornish Boilers, with the fire placed in an internal circular flue, are generally preferred where fuel can be obtained at a moderate cost; we therefore quote for this description in the Price List. They are made of the best material, extra strong, and tested by hydraulic pressure to 120 lb. per square inch. The fittings consist of two safety valves, pressure gauge, gauge-glass fittings, gauge taps, blow-off cock, fire bars, bearers, wrought-iron bridge, draught regulators, &c., &c.

STATIONARY STEAM-ENGINES.

CORNISH BOILERS.

Horse-power.	Diameter of Cylinder in Inches.	Length of Stroke in Inches.	Speed in Revolutions per Minute.	Price.	Length.	Diameter.	Diameter of Flue.	Weight, including Fittings, in Cwts.	Price.
4	6 $\frac{1}{2}$	10	150	£ 70	7' 6"	3' 9"	2' 0"	49	£ 70
6	8 $\frac{1}{2}$	12	125	95	10' 0"	4' 3"	2' 4"	75	95
8	9 $\frac{1}{2}$	12	125	120	13' 0"	4' 4"	2' 5"	84	120
10	10 $\frac{1}{2}$	14	110	145	14' 6"	4' 8"	2' 8"	96	145
12	12	16	95	165	14' 6"	5' 3"	2' 10"	109	165
14	13 $\frac{1}{2}$	16	95	190	17' 0"	5' 3"	3' 0"	117	190
16	14 $\frac{1}{2}$	20	85	210	19' 0"	5' 8"	3' 0"	130	210
20	15 $\frac{1}{2}$	24	70	260	22' 0"	6' 2"	two 2' 4" or one 3' 3"	145	260

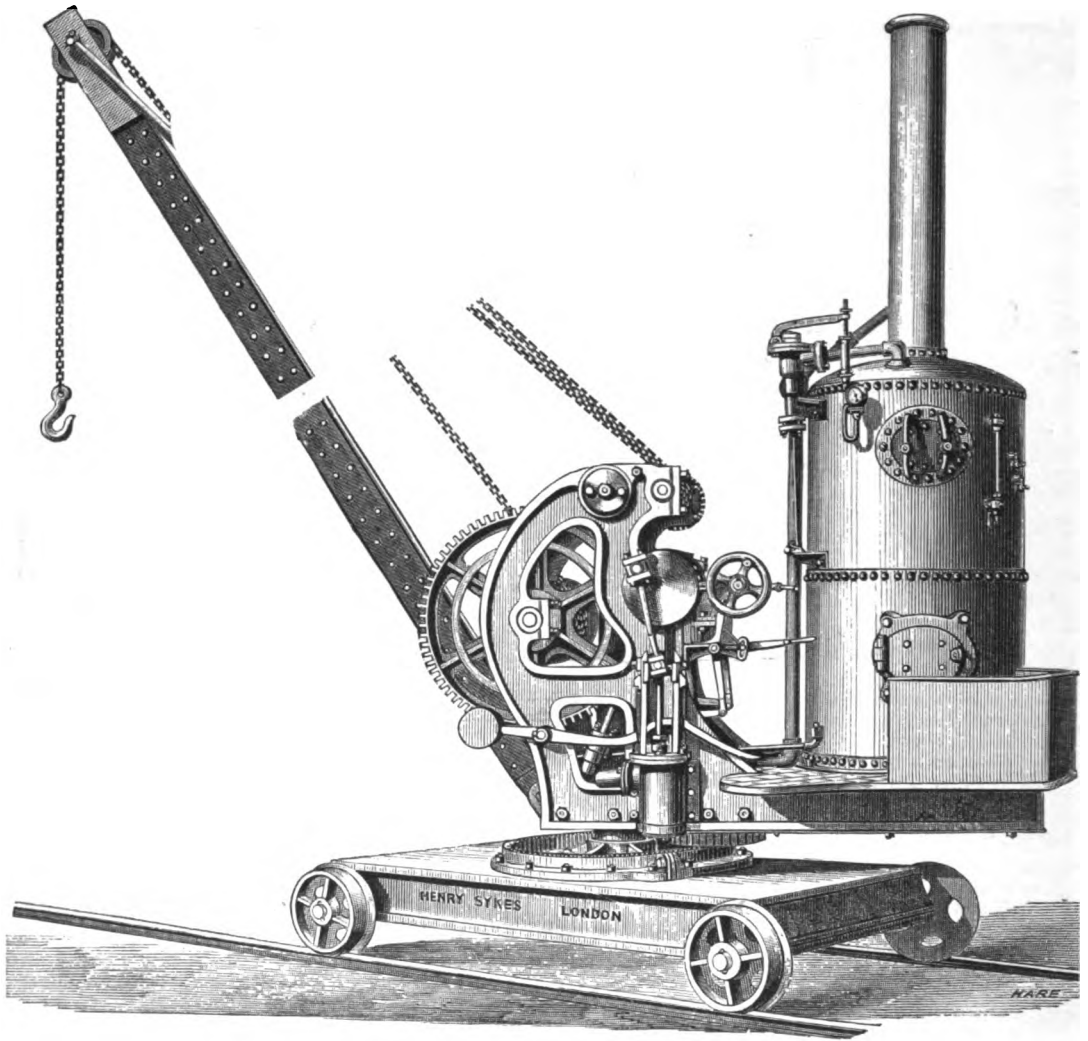
Packing Engine for Export, in strong framed case closely boarded and fly wheel hay-banded, 15s. per horse-power.

The Prices include all to the ends of Stop Valve, Force Pump, and Fly-Wheel Shaft, also the Foundation Bolts and Plates for holding down the Engines.

Arrangements made for the erection and starting of these Engines, with or without Boilers.

HENRY SYKES, 66, BANKSIDE, LONDON, S.E.

PORTABLE STEAM-CRANES.



In these Cranes some important improvements have been introduced, one of which is bringing the base nearer the ground ; they are fitted with Link Motion, and the slewing of the Crane is effected by Steam in either direction ; the central Pillar is of Wrought Iron ; they are fitted with two Cylinders, Foot Brake, and Lever ; the pinion slides on a feather let in the shaft ; all the appliances are within the easy control of one man ; and they are constructed of the best material and workmanship.

Reference to the accompanying Illustration will explain the general character of these Cranes.

PRICES.

To lift 2 Tons.
£320

3 Tons.
£350

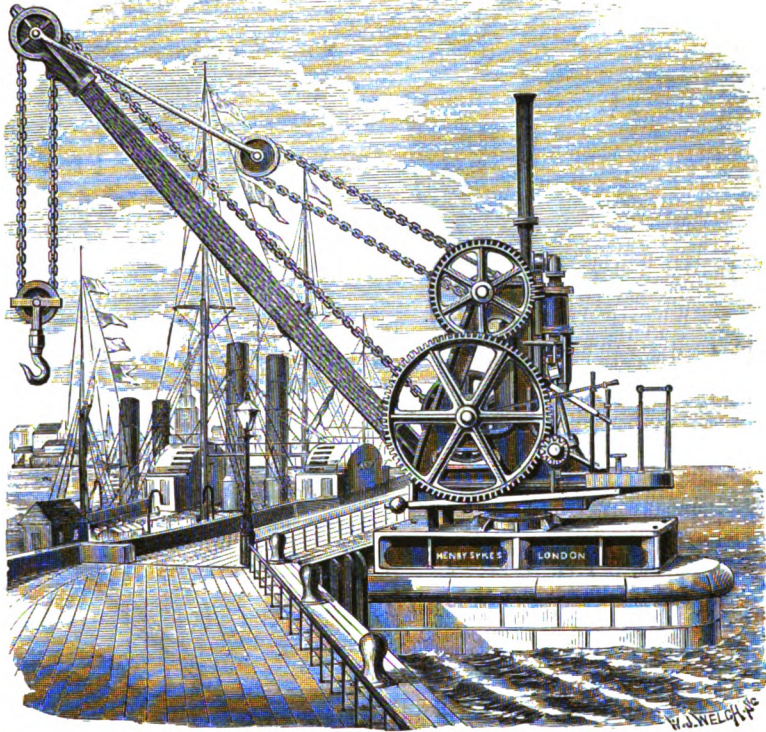
HENRY SYKES, 66, BANKSIDE, LONDON, S.E.

Any Engine, Pump, Hand or Steam Crane, Hoist, Winding Engine, Mortar Mill, or other Machinery in Stock may be had ON HIRE.

STEAM WHARF CRANE.

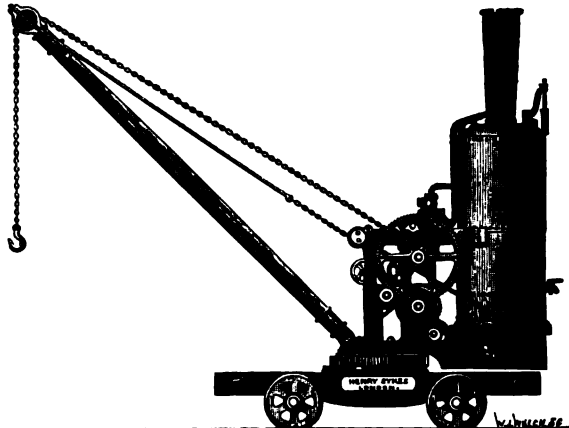
These Cranes are fitted with Two Cylinders, Link Motion; they hoist and turn either way by Steam power separately or together; all the Gearing is under the easy control of one man. Steam is supplied to the Crane from a stationary Boiler, which may be at any convenient distance from the work.

I have made Cranes of this construction capable of lifting 15 tons, and which are now at work in London.



STEAM TRAVELLING CRANES.

Steam Crane, lifting and steering the load simultaneously, is a useful and quick Crane for light work; mounted on Flanged Wheels to 4 feet 8½ inches Gauge, or with Flat Wheels; has a Wrought Iron Crane Post. A number of these Cranes were supplied by me during the construction of the Metropolitan Railways for excavating work, giving entire satisfaction.



PRICES OF THE ABOVE MAY BE HAD UPON APPLICATION.

HENRY SYKES, 66, BANKSIDE, LONDON, S.E.

Any Engine, Pump, Hand or Steam Crane, Hoist, Winding Engine, Mortar Mill, or other Machinery in Stock may be had ON HIRE.



WROUGHT-IRON CONTRACTORS' TIPPING SKIPS.

With Boss for the Bale Catch, and strong Bow, as shown.

PRICES.

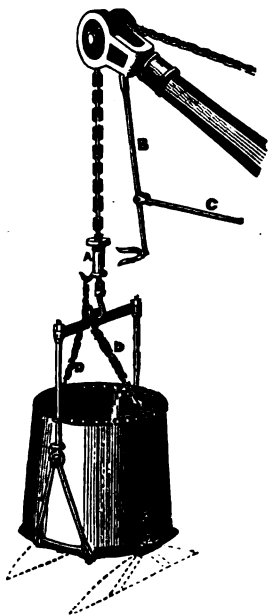
To hold, cubic yards	$\frac{1}{4}$ yard.	$\frac{1}{2}$ yard.	$\frac{3}{4}$ yard.	1 yard.
	£ s. 4 15	£ s. 7 10	£ s. 10	£ s. 12

WOODFORD SKIP.

Discharging its load by means of a Catch, as shown.

To hold, cubic yards	$\frac{1}{4}$ yard.	$\frac{3}{4}$ yard.
	£ s. 10 10	£ s. 14 0

DUNBAR SKIP.



DUNBAR SKIPS, for discharging the load at the bottom, with Catch applied, as shown.

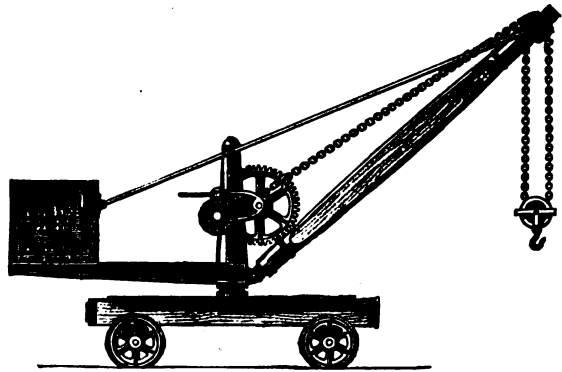
Same price as Woodford's Skips.

HENRY SYKES, 66, BANKSIDE, LONDON, S.E.

Any Engine, Pump, Hand or Steam Crane, Hoist, Winding Engine, Mortar Mill, or other Machinery in Stock may be had ON HIRE.

CRANES.

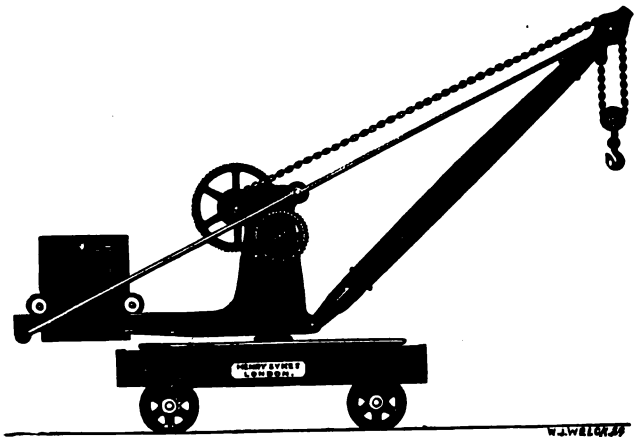
The 1-Ton Crane only is single purchase, the 2 and 3 Ton Cranes have both quick and slow motion, Turned Shafts, Gearing carefully fitted; they are all supplied with Brake, Balance Box for weighting, Wrought-Iron Axles, with Flanged or Flat Wheels, two Winch Handles, Jib Chain and Hook, and mounted complete on strong Oak Frame.



PRICES.

To lift 1 Ton	..	..	..	..	Radius 9 feet	..	..	..	..	£42
„ 2 Tons	..	..	..	..	„ 9 „	..	..	..	..	58
„ 3 „	..	..	..	..	„ 10 „	..	..	..	..	66

The Cranes of this description are all fitted with quick and slow motion, powerful Brake, Hammered-Iron Pillar (with the exception of the 3 Ton, which has Cast-Iron Pillar), Balance Box for weighting, Bearing Rollers around the Pillar, Shafts turned, and Gear well fitted. Cast-Iron Sole Plate, mounted on strong Oak Frame, and supplied with Best-best Tested Chain and Return Block.



Where either of the above Cranes are required for shipment they can, if desirable, be sent without the woodwork at a reduced price, in which case a detailed drawing to scale will be sent for their erection upon the wood framing.

These Cranes, from 1 to 6 Tons, always ready or in course of construction here.

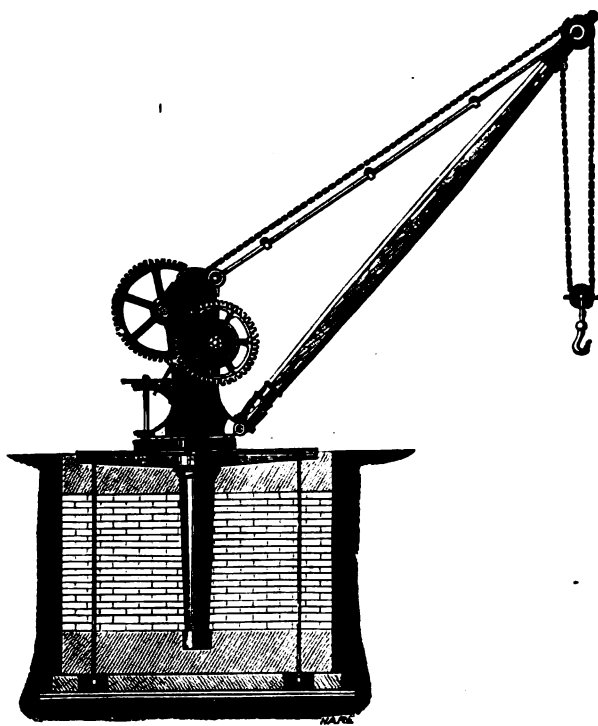
PRICES.

To lift 3 Tons	..	..	..	..	Radius 10 feet	..	..	..	..	£77
„ 4 „	..	..	..	..	„ 10 „	..	..	..	..	112
„ 5 „	..	..	..	..	„ 11 „	..	..	..	..	140
„ 6 „	..	..	..	..	„ 11 „	..	..	..	..	180
„ 8 „	..	..	..	..	„ 12 „	..	..	..	..	200
„ 10 „	..	..	..	..	„ 12 „	..	..	..	..	235

HENRY SYKES, 66, BANKSIDE, LONDON, S.E.

Any Engine, Pump, Hand or Steam Crane, Hoist, Winding Engine, Mortar Mill, or other Machinery in Stock may be had ON HIRE.

WHARF CRANE.

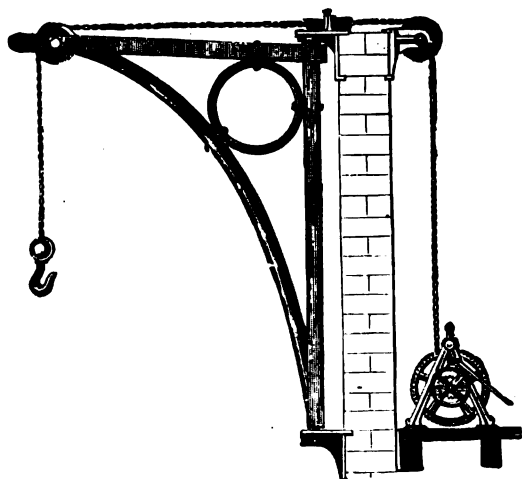


These Cranes are fitted with Wrought-Iron Pillar; above 3 Tons, quick and slow motion, Brake and Lever, and are supplied with Foundation Plates and Bolts, Return Block and Chain. The 1 Ton and 2 Ton sizes have no Return Block, and have Cast-Iron Pillars.

PRICES.

To Lift	Radius.	Price.	If with Jibbing or Radiating Gear.
ton.	feet.	£	£
1	12	33	..
2	13	45	..
3	14	65	71
4	14	83	90
5	15	108	120
6	15	130	140
8	15	165	178
10	15	215	225

WROUGHT-IRON STRONG JIB CRANE.



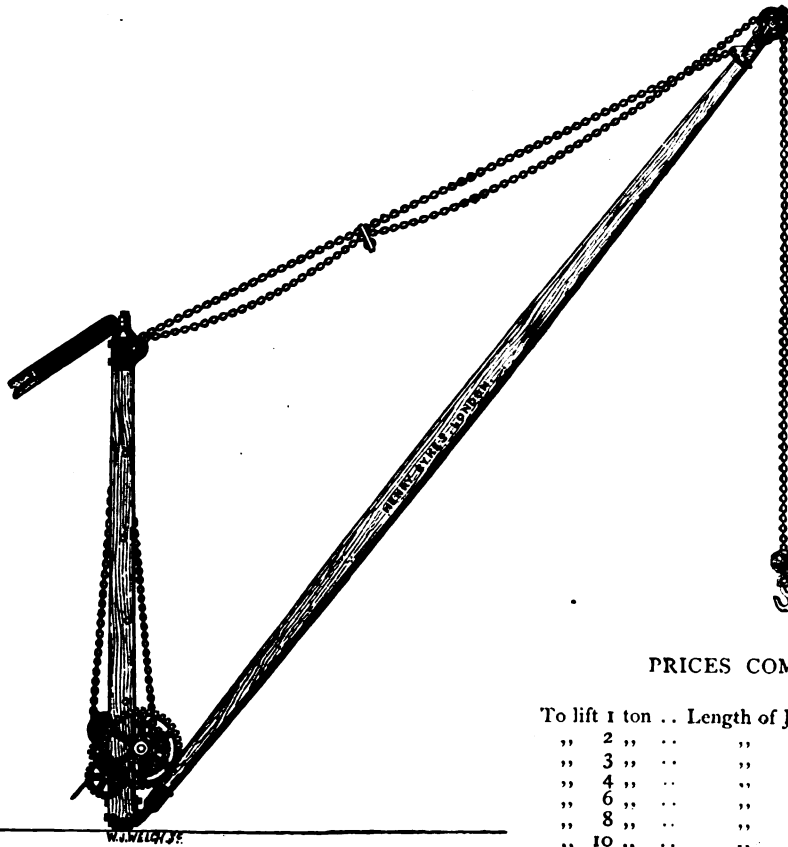
Price, with Wall Brackets, Bolts, and Nuts for 14-inch Wall, or thicker, Chain Pullies and Rollers. Chain and Crab Winch extra.

To Lift.	Radius.	Height.	Price.	Suitable Crab Winch.	Brake Extra.	Size of Chain	Best Tested Crane Chain. Per Ft.
ton.	ft. in.	ft. in.	£	£ s.	s. d.	inches.	s. d.
$\frac{1}{2}$	3 0	4 6	8	2 10	11 6	$\frac{3}{8}$	0 8
1	3 6	5 0	9	4 10	12 6	$\frac{7}{16}$	0 10
$1\frac{1}{2}$	3 6	5 0	12	5 10	12 6	$\frac{1}{2}$	1 0
2	4 0	6 0	13	8 15	15 0	$\frac{5}{8}$	1 3
3	5 0	6 6	18	8 15	15 0	$\frac{3}{4}$	1 6

HENRY SYKES, 66, BANKSIDE, LONDON, S.E.

Any Engine, Pump, Hand or Steam Crane, Hoist, Winding Engine, Mortar Mill, or other Machinery in Stock may be had ON HIRE.

HENDERSON'S DERRICK CRANES.

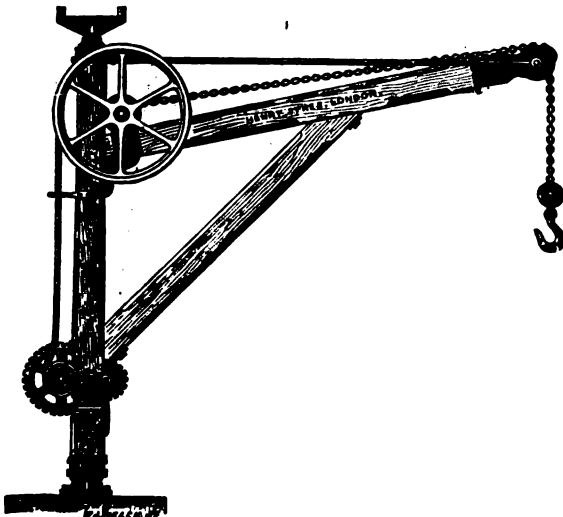


These useful Cranes are self contained and require but little foundation, they swing about three-fourths round the centre ; the lifting and swinging of the load can be done simultaneously, they are all fitted with quick and slow motion.

PRICES COMPLETE.

To lift	Length of Jib	25 feet	.. £40	Extra for each 5 ft. added to Jib, up to 45 feet.	Price of Ironwork only.
" 1 ton ..	" 25 feet ..	" 25 feet ..	" 25 feet ..	£2 10	
" 2 " ..	" 35 " ..	" 35 " ..	" 35 " ..	3 15	
" 3 " ..	" 35 " ..	" 35 " ..	" 35 " ..	4 15	
" 4 " ..	" 35 " ..	" 35 " ..	" 35 " ..	6 0	
" 6 " ..	" 35 " ..	" 35 " ..	" 35 " ..	119	
" 8 " ..	" 35 " ..	" 35 " ..	" 35 " ..	162	
" 10 " ..	" 35 " ..	" 35 " ..	" 35 " ..	202	

PLATFORM CRANE.



Has three motions : light weights, to about 4 cwt. are lifted by pulling at the rope. The handle is used on the rope barrel shaft for heavier weights, and on the pinion shaft for extreme loads. Supplied complete with step, top bracket, rope and chain.

The 10-cwt. and 1-ton Cranes are without gearing, having handles on the barrel shaft only.

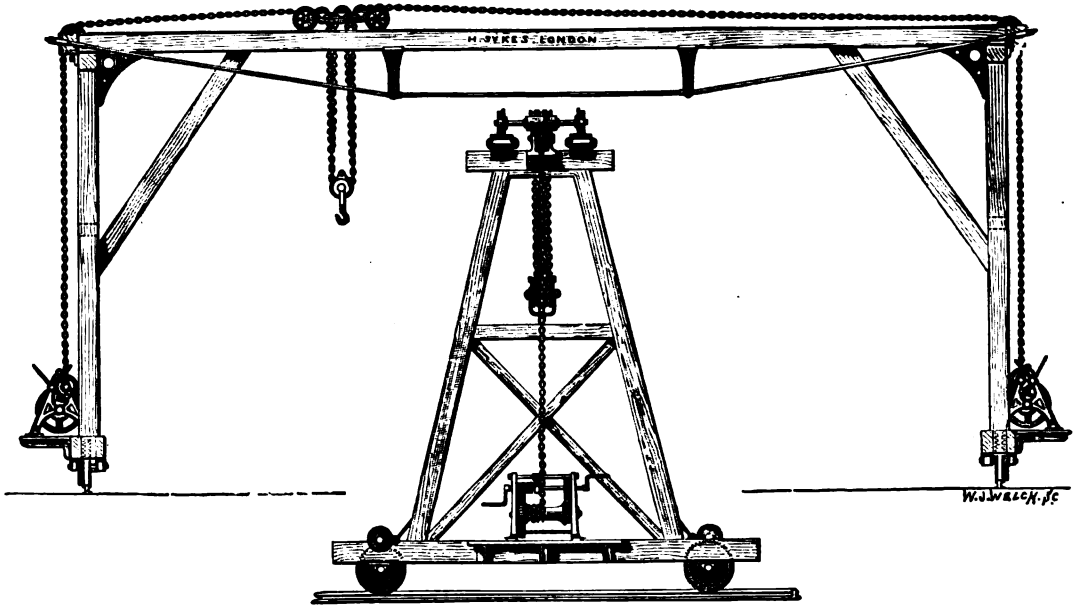
PRICES.

To lift	Radius	7 feet	.. £17
" 10 cwt. ..	" 7 feet ..	" 7 feet ..	" 7 feet ..
" 1 ton ..	" 9 " ..	" 9 " ..	" 9 " ..
" 2 " ..	" 12 " ..	" 12 " ..	" 12 " ..
" 3 " ..	" 12 " ..	" 12 " ..	" 12 " ..

HENRY SYKES, 66, BANKSIDE, LONDON, S.E.

Any Engine, Pump, Hand or Steam Crane, Hoist, Winding Engine, Mortar Mill, or other Machinery in Stock may be had ON HIRE.

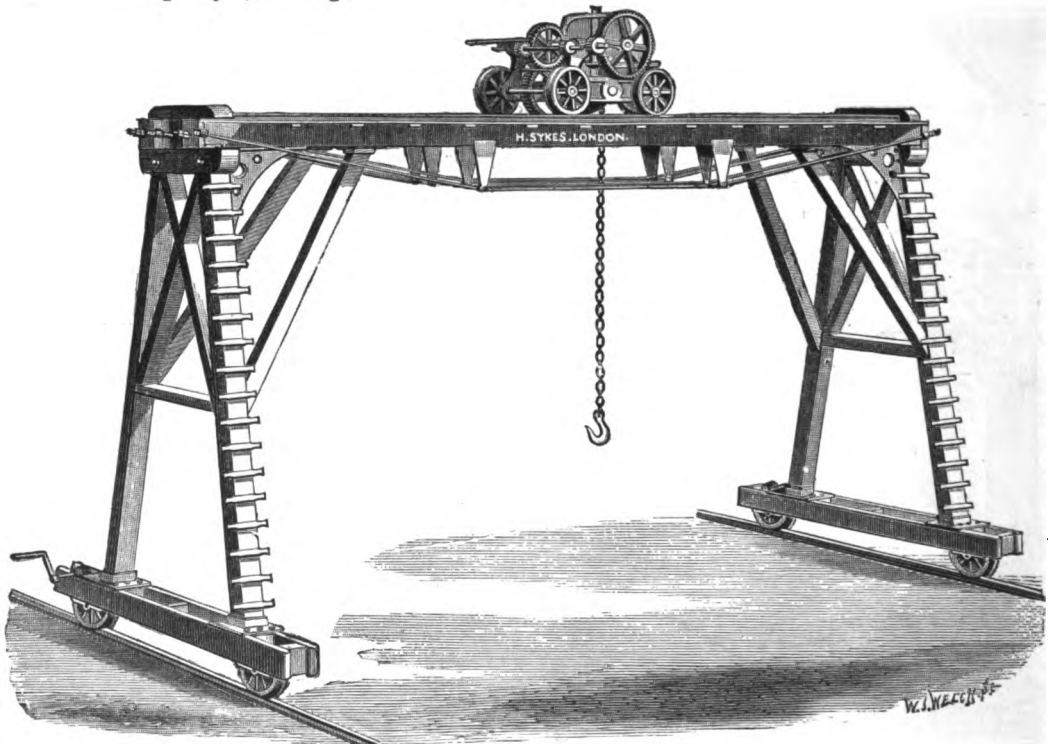
TRAVELLING CRANES.



In the above Traveller the work is done from below. By winding one of the crabs and unwinding the other at the same time, the top carriage and load suspended from it travel from one end of the Cross Cranes to the other; and by winding or unwinding one of the crabs only, the load is raised or lowered.

The lower Engraving represents a Travelling Crane wherein the weight is lifted from the top of the frame, and the travelling is effected by graving at the bottom part of it upon the ground.

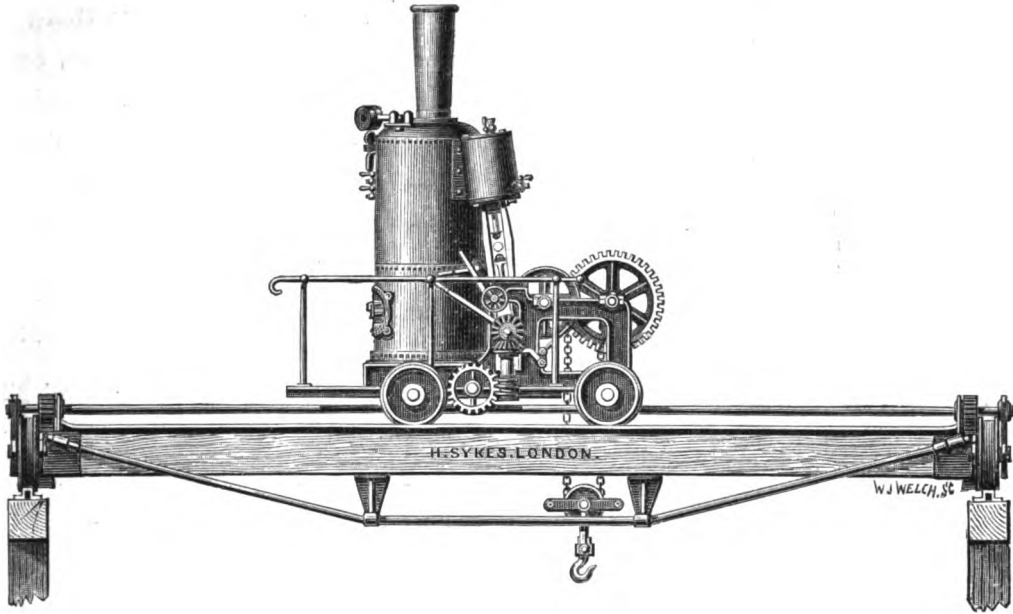
Prices according to span, and weight to be lifted.



HENRY SYKES, 66, BANKSIDE, LONDON, S.E.

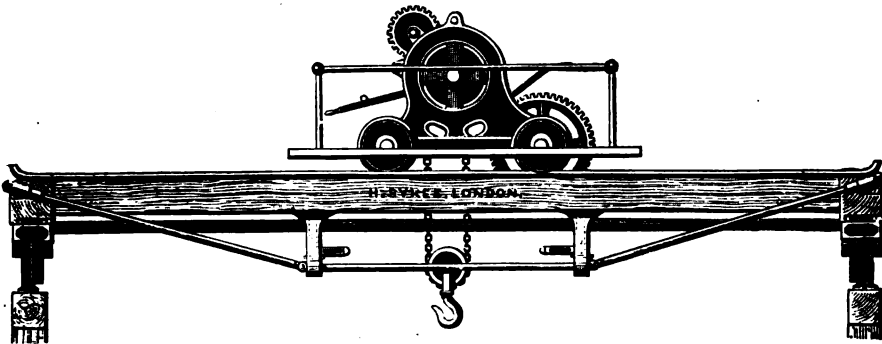
Any Engine, Pump, Hand or Steam Crane, Hoist, Winding Engine, Mortar Mill, or other Machinery in Stock may be had ON HIRE.

OVERHEAD STEAM TRAVELLER.



The Engines and Boilers of these Cranes are of the usual vertical type ; the Engines are fitted with a pair of Cylinders and link motion. The crab works in either single or double gearing, foot brake and pawl ; and all the motions for lifting and travelling, both longitudinally and transversely, are worked by the Engine, and under complete control of the engineman.

OVERHEAD HAND TRAVELLER.



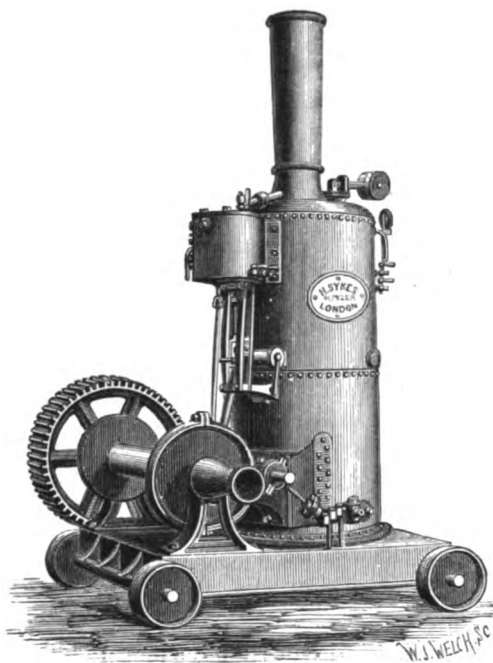
The crab is fitted with single or double purchase gear and powerful brake ; it will carry the load longitudinally or transversely, the whole being worked from one platform, which is connected to the crab.

Prices and specifications of these Travellers may be had on application.

HENRY SYKES, 66, BANKSIDE, LONDON, S.E.

Any Engine, Pump, Hand or Steam Crane, Hoist, Winding Engine, Mortar Mill, or other Machinery in Stock may be had ON HIRE.

HOISTING ENGINES.



These Engines are mounted on strong Iron Frames, and are complete with Boiler, Engine, Winch, Foot Brake, Regulator Handle, &c., all under the easy control of the driver; they can be used as Barrow Hoists, for Pile Driving, or for other purposes; link motion can be applied when required, at an extra cost.

The Engraving shows the ordinary Vertical Engine with Single Cylinder, applied to a Winch; but I also make them with Two Cylinders.

Prices are given below for both descriptions of Engines.

SINGLE CYLINDER.

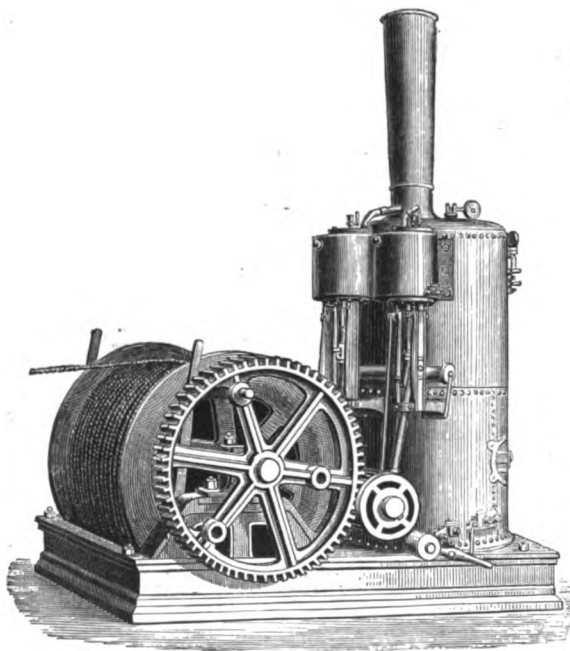
Diameter of Cylinder, without wheels.

4½ in.	5½ in.	6 in.	6¾ in.	7½ in.	8½ in.
£100	£140	£165	£180	£220	£235

DOUBLE CYLINDERS.

Diameter of Cylinders, without wheels.

5½ in.	6 in.	6¾ in.
£225	£250	£275



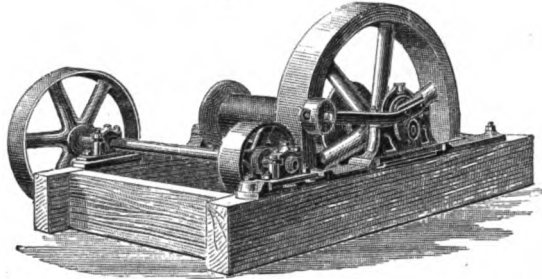
If supplied without wheels and axles the first three sized Single-Cylinder Engines £5 less, and for the remaining, both Single and Double Cylinders, £7 less.

HENRY SYKES, 66, BANKSIDE, LONDON, S.E.

Any Engine, Pump, Hand or Steam Crane, Hoist, Winding Engine, Mortar Mill, or other Machinery in Stock may be had ON HIRE.

BARROW HOIST.

This simple Machine was put up by me about ten years ago, and since then it has been adopted, and various builders have had it in use. I have supplied it advantageously for dragging Timber, where it may have been unloaded, a considerable distance to the Saw Mill, and made it the means of placing the Timber on the Bench for cutting. It was also applied in a slightly different form for the Hoisting all the Bricks and Mortar in Broad Street Station, the Grosvenor Buildings, Hyde Park, &c.

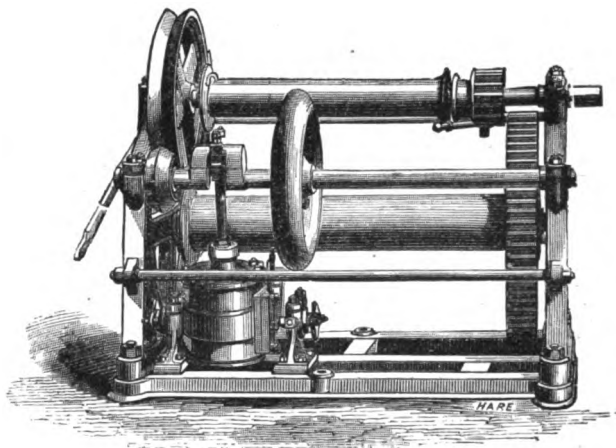


The whole action of the Machine tends upon shifting the centre of the barrel by means of an eccentric, which is thrown in and out of contact by a movement of about $\frac{1}{4}$ of an inch; one way the chain barrel pulley comes in contact with the driving wheel, and the other way the barrel is thrown on to the brake, the bow attached to the eccentric giving the motion in either direction.

PRICE £25.

DOUBLE-BARREL HOIST.

The top barrel of this Hoist is worked by friction wheels, and the second purchase by toothed gear. It is adapted for Steam, as shown in the Illustration, or fitted with fast-and-loose pulley and driven by a band from an ordinary Portable or Vertical Engine.



PRICE, WITH ENGINE WORK, £80

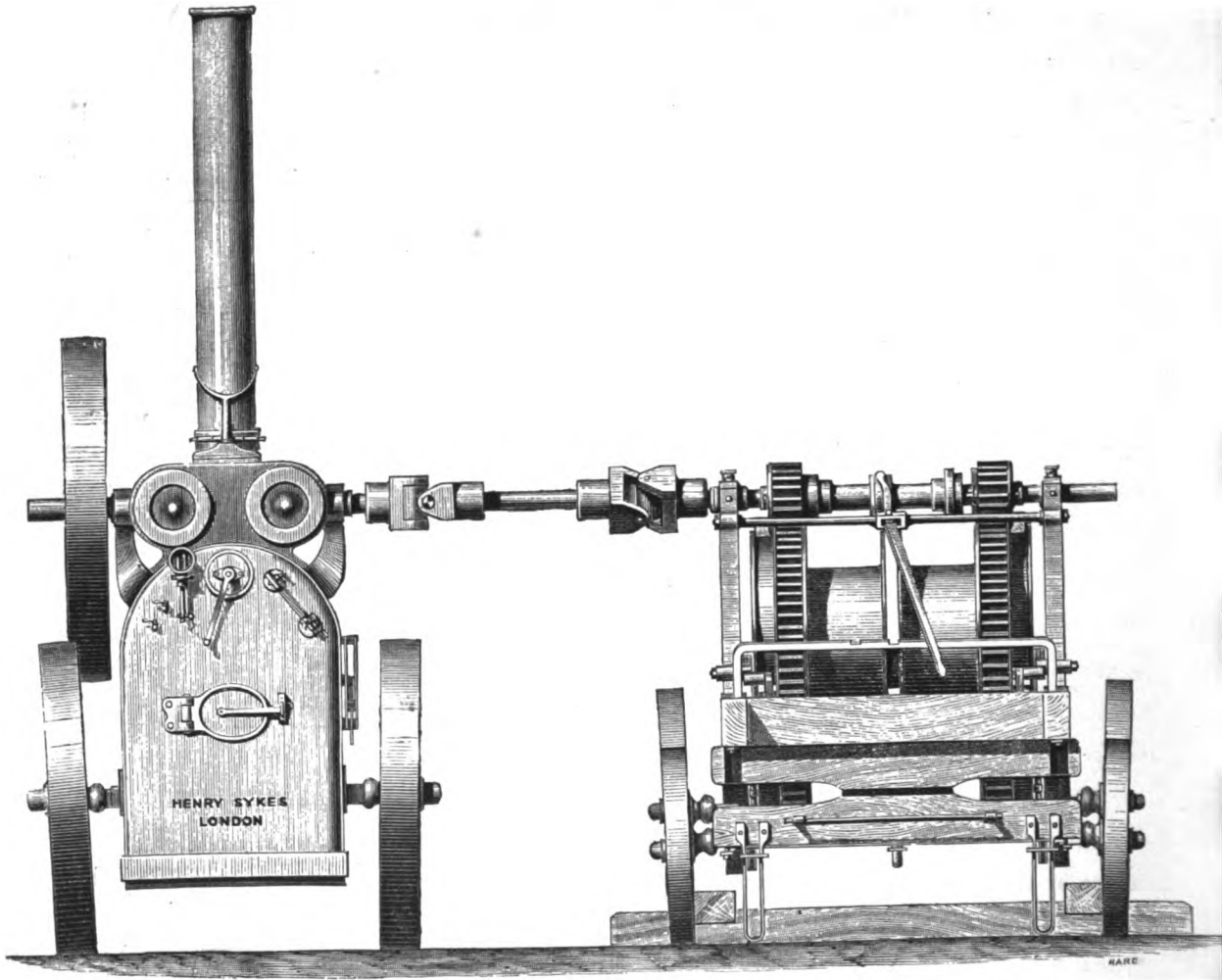
„ WITHOUT DITTO .. £50

HENRY SYKES, 66, BANKSIDE, LONDON, S.E.

Any Engine, Pump, Hand or Steam Crane, Hoist, Winding Engine, Mortar Mill, or other Machinery in Stock may be had ON HIRE.

WINDING AND HOISTING MACHINERY,

FOR MINES, INCLINED PLANES, &c.



The Engine is of the Portable description indicated in previous pages, but is fitted with Link Motion for Reversing. A brake can be applied to the fly wheel of the engine if desired, in addition to the powerful brake which is applied to the gear; the crank shaft of the Engine is attached to the winding gear, by means of a strong universal joint, which allows for any slight deviation from a straight line which may take place. The drums of the gear are arranged for winding and lowering simultaneously, or can be used either separately or together, and each is fitted with a strong lever brake, and the whole is made portable, strong, and efficient.

PRICES AND SPECIFICATIONS ON APPLICATION.

HENRY SYKES, 66, BANKSIDE, LONDON, S.E.

Any Engine, Pump, Hand or Steam Crans, Hoist, Winding Engine, Mortar Mill, or other Machinery in Stock may be had ON HIRE.

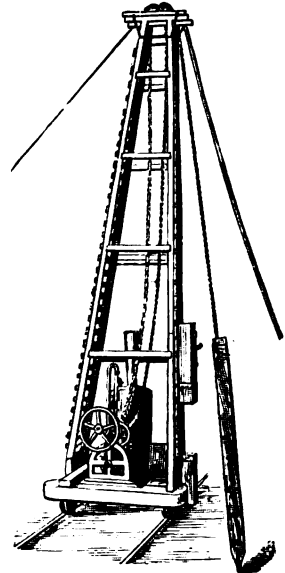
PILE DRIVERS.

HAND PILE DRIVER, WITH WINCH, CHAIN, MONKEY, NIPPERS,
TOP GEAR.

	Price.	With Framework Complete.
With 15-cwt. Monkey	£28	£45
20 " "	£37	£60

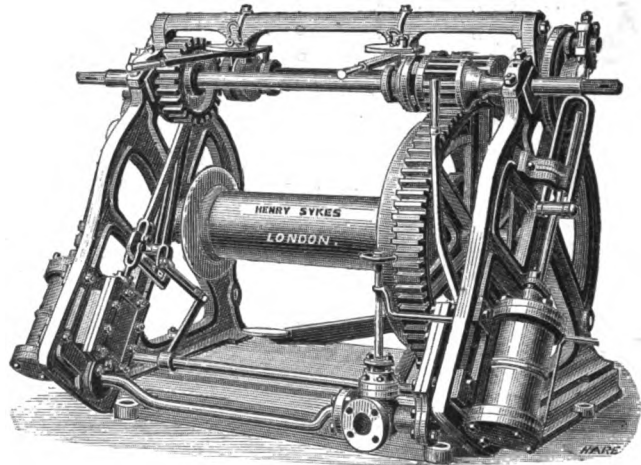
STEAM PILE DRIVER, WITH WINCH, BOILER, FRAMING,
MONKEY, &c., £225.

ENGINE, BOILER, AND STEAM CONNECTIONS ONLY, £170.



DOUBLE-CYLINDER STEAM WINCHES.

In these Winches the steam connecting pipe is of copper. Each Winch is fitted with handles for use when steam is down; link motion, for reversing; foot brake and lever; and can be worked in single and double gear. They can be had with or without warping ends, and either single or a pair of Cylinders. Can be used for warehouses, pile driving, as well as for ship purposes.



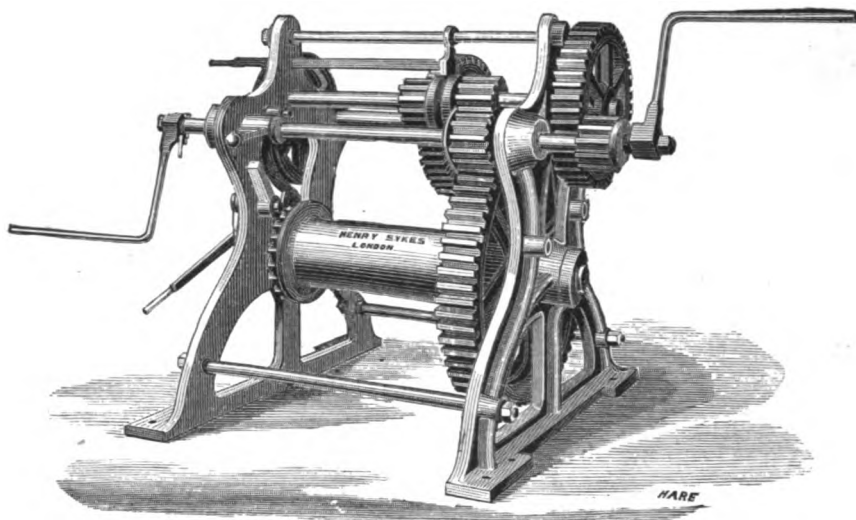
			£	s.	d.
With 2 Cylinders	Lifting 1 Ton direct		80	0	0
2 "	" 2 Tons direct		90	0	0
2 "	" 3 "		100	0	0
2 "	" 4 "		110	0	0
2 "	" 5 "		120	0	0

HENRY SYKES, 66, BANKSIDE, LONDON, S.E.

*Any Engine, Pump, Hand or Steam Crane, Hoist, Winding Engine, Mortar Mill, or other Machinery
in Stock may be had ON HIRE.*

CRABS.

VERY STRONG, AND KEPT IN STOCK FOR LIFTING UP TO 30 TONS.



SINGLE PURCHASE.

To lift with 1 to 2 Sheave Pulley Blocks.		Without Brake.		With Brake.	
		£	s. d.	£	s. d.
No. 3	.. 2 Tons ..	4	5 6	5	10 0
4	.. 3 " ..	5	0 0	6	10 0
6	.. 6 " ..	7	5 0	8	15 0
7	.. 8 " ..	10	10 0	12	0 0

If Brass Bushed, 25s. extra.

DOUBLE PURCHASE.

To lift with 1 and 2 Sheave Pulley Blocks.		Without Brake.		With Brake.	
		£	s. d.	£	s. d.
No. 12	.. 4 Tons ..	7	7 6	8	17 6
15	.. 10 " ..	13	12 0	15	15 0
17	.. 16 " ..	20	0 0	23	10 0
18	.. 20 " ..	25	0 0	27	10 0

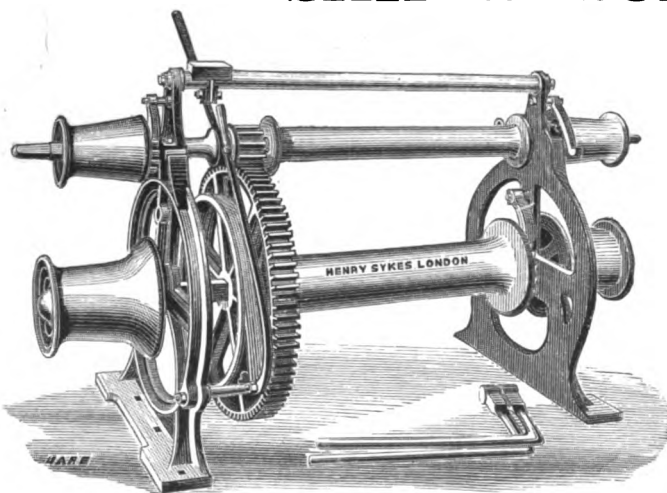
If Brass Bushed, No. 12, 27s. 6d. extra.

" " " 15, 35s. 0d. "
" " " 17 and 18, 43s. 0d. extra.

TREBLE PURCHASE.

No. 19, to lift 30 Tons, with 2 and 3 Sheave Blocks, £38.

SHIP WINCHES.



SINGLE PURCHASE.

To lift direct.	Price.	Distance between sides.
	£	
No. 21 .. 10 cwt. ..	4	.. 2' 0"
22 .. 15 " ..	7	.. 3' 0"
23 .. 20 " ..	10	.. 3' 6"
24 .. 30 " ..	13	.. 4' 0"
25 .. 40 " ..	18	.. 5' 0"

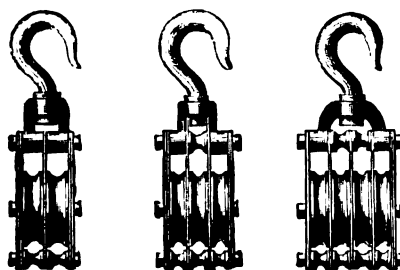
DOUBLE PURCHASE.

No. 26 .. 25 " ..	8	.. 3' 0"
27 .. 40 " ..	12	.. 3' 6"
28 .. 60 " ..	15	.. 4' 0"
29 .. 80 " ..	21	.. 5' 0"

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PULLEY



BLOCKS.

LONDON PATTERN WROUGHT-IRON PULLEY BLOCKS.

Diameter of Sheave	2½"	3½"	4"	4½"	5"	6"	7"	8"	9"	10"	11"	12½"	14"	15"	16"
Width of Groove ..	¾"	¾"	¾"	¾"	¾"	1"	1¼"	1½"	1½"	1½"	2"	2½"	2½"	3"	3¼"
s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Snatch Block ..	6 0	6 0	7 0	8 6	11 6	13 6	16 6	21 6	32 0	60 0	80 0	110 0	140 0	170 0	210 0
1 Sheave	4 0	4 6	5 9	7 6	10 0	11 6	14 0	19 0	30 0	52 6	72 0	98 0	115 0	130 0	164 0
2 Sheaves	5 6	7 0	8 6	11 0	15 6	17 0	24 6	35 6	50 0	98 0	124 0	144 0	170 0	203 0	242 0
3 „	7 0	8 6	10 6	14 0	19 6	21 6	30 6	48 6	70 0	127 0	157 0	190 0	222 6	262 0	310 0
4 „	8 6	10 0	12 6	18 6	25 6	28 6	46 0	63 0	92 6	157 0	190 0	222 6	280 0	352 0	400 0
Brass Sheaves, extra per Sheave ..	0 9	1 6	2 0	3 0	4 6	6 3	7 9	11 6	15 3	21 6					
Diam. of Chain the Blocks will take ..	..	..	..	1⅞"	1½"	1⅞"	2"	1⅞"	1½"	1⅞"	2"	1⅞"	2"	1⅞"	1½"

GIN BLOCKS OR RUBBISH WHEELS.

Diameter of Pulley	3½"	4½"	6"	7"	8"	9"	10"	11"	12"	14"	16"	18"	20"	22"
Width of Groove ..	¾"	¾"	1"	1¼"	1"	1"	1"	1"	1"	1½"	1½"	1½"	1½"	1½"
s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
PRICE	5 9	6 3	7 0	7 9	8 6	9 3	10 0	11 0	12 0	13 0	16 6	21 0	24 0	27 6

BEST PROVED SHORT-LINK CRANE CHAIN.

Diameter of Iron ..	1"	1½"	2"	2½"	3"	3½"	4"	4½"	5"	5½"	6"	7"	8"	9"
s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Price per cwt. ..	64 6	59 0	51 6	47 0	43 0	40 6	39 6	39 0	38 6	37 6	37 0	37 0	37 0	37 0
Proof Strain, tons ..	1	1	2	3	4	5	6	7	9	12	15	16	21	26
Weight per yard, lbs. ..	2½	2½	4	5½	7	9	12	13½	15	21	28	36	40	48

Working Strain of Chains should not exceed half the Proof Strain.

BEST WHITE MANILLA ROPE FOR PULLEY BLOCKS.

Circumference ..	2"	2½"	3"	3½"	4"	5"	5½"	6"	7"	8"	9"	10"	11"	12"
Breaking Strain, tons ..	1½	2	2½	3	4	6	8	11	14	18	22	28	35	42
Working Load, cwt. ..	4	5	7	8	10	13	21	26	37	40	51	64	77	90
Approximate Weight per Fathom, lbs. ..	1	1½	2	2½	3½	4½	6½	8	11½	13	16½	21	26	31
s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
„ Price ..	0 10	1 6	1 9	2 6	2 10	3 6	5 6	6 9	9 0	11 0	14 0	17 0	21 0	25 0

HENRY SYKES, 66, BANKSIDE, LONDON, S.E.

Any Engine, Pump, Hand or Steam Crane, Hoist, Winding Engine, Mortar Mill, or other Machinery
in Stock may be had ON HIRE.

PULLEY BLOCKS.

WESTON'S PATENT DIFFERENTIAL PULLEYS

Will lift a weight with much less labour than other pulleys. The powers given are simply as a general guide, not as a guarantee.



Tested to	cwt. 5	cwt. 10	cwt. 12	cwt. 20
Price without Ratchet	£ s. d. 1 0 0	£ s. d. 1 10 0	£ s. d. 1 10 0	£ s. d. 2 0 0
Chain, per foot	0 0 6	0 0 6	0 0 7	0 0 9
With Ratchet	..	..	..	2 13 0
Chain, per foot	..	..	..	0 0 9

Tested to	cwt. 30	cwt. 40	cwt. 60
Price without Ratchet	£ s. d. 2 15 0	£ s. d. 3 5 0	£ s. d. ..
Chain, per foot	0 0 10	0 0 10	..
With Ratchet	3 5 0	3 12 6	5 7 6
Chain, per foot	0 0 10	0 0 10	0 1 1

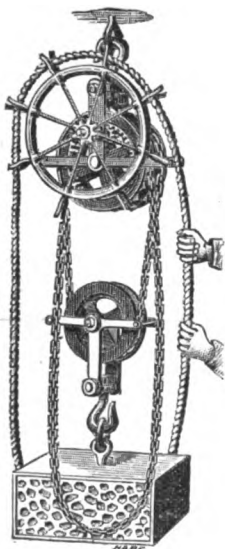
The length of Lift should always be stated, or the length of Chain, reckoning it at four times the height of Lift.

QUICK MOTION PULLEY.

For lifting sacks, &c. Tested to $\frac{1}{2}$ ton. Price 30s. Chain, 6d. per foot.

WESTON'S PATENT DIFFERENTIAL PULLEYS.

With Sprocket, Wheel, and Rope.



Tested to	tons. 2	tons. 3	tons. 4	tons. 5
Price	£ s. d. 4 0 0	£ s. d. 5 15 0	£ s. d. 7 0 0	£ s. d. 10 0 0
Chain, per foot	0 0 10	0 1 1	0 1 3	0 1 6
Rope „	0 0 3	0 0 3	0 0 3½	0 0 3½

Tested to	tons. 6	tons. 8	tons. 10
Price	£ s. d. 12 0 0	£ s. d. 16 0 0	£ s. d. 20 0 0
Chain, per foot	0 2 4	0 3 0	0 3 6
Rope „	0 0 3½	0 0 3½	0 0 3½

The length of Lift should always be stated, or the length of Chain, reckoning it at about three times the height of Lift.

Before using this or any other Pulleys, as a safeguard against risk of injury to anything valuable, purchasers should try them to their indicated power, with something involving no damage in case of fracture. Also, when ordering, allow a suitable margin, instead of working them too near their indicated powers.

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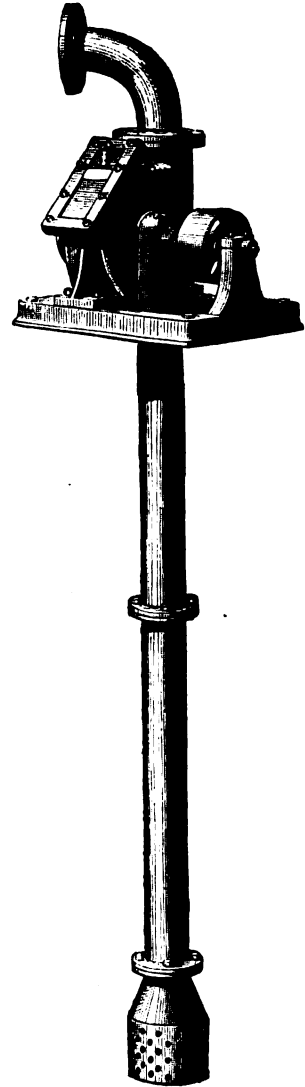
CENTRIFUGAL PUMPS.

The running fans or discs of these Pumps are made of the best gun-metal, cast in one piece, and the spindles are of steel. The whole, as well as the bearing brasses, are finished to gauges, so that duplicate parts can be sent at any time.

By means of the covers, the fan and all the working parts may be removed in a few minutes, without breaking the joints of either suction or delivery pipes.

I have supplied these Pumps in many instances to River Conservancies, and to numerous Ship Insurance Companies and private Shipowners, for assisting in raising sunken vessels, and have always a number of them on hand, for these and other purposes.

I keep also for ship purposes, where a direct lift cannot always be had, a quantity of indiarubber suction pipe for such an adaptation, or for connection from barge to vessel, so as to admit of the rising of the vessel without breaking joints.



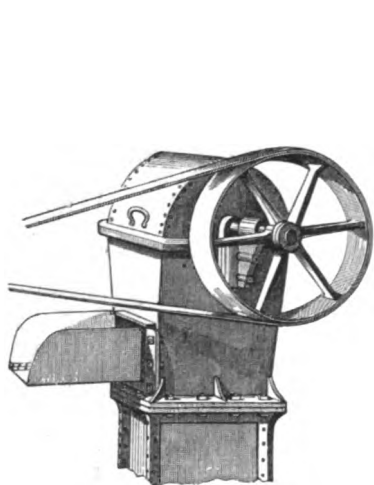
Diameter of Pipes.	Gallons of Water discharged per Minute.			Price of Pump. £	Price of Foot Valve and Strainer. £ s. d.		
5"	..	..	400	..	..	25	3 10 0
6"	..	..	600	..	..	27	4 0 0
7"	..	..	800	..	..	37	5 0 0
8"	..	..	1000	..	..	40	6 0 0
9"	..	..	1300	..	..	45	7 0 0
10"	..	..	1700	..	..	55	8 0 0
12"	..	..	1800	..	..	90	10 0 0
15"	..	..	4000	..	..	105	14 0 0
18"	..	..	5000	..	..	170	22 0 0
20"	..	..	7000	..	..	190	25 0 0

A large stock of these and various other descriptions of Pumps kept ready for delivery.

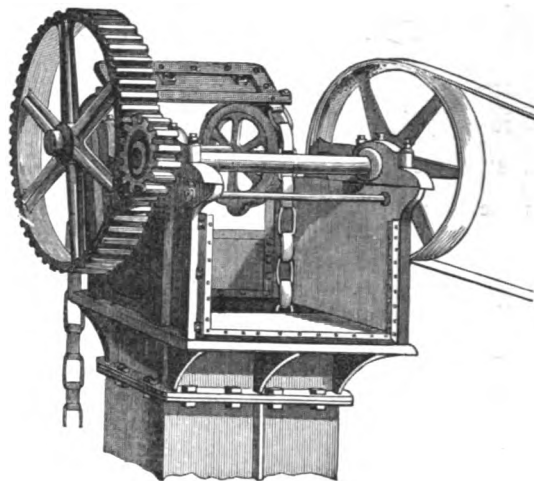
HENRY SYKES, 66, BANKSIDE, LONDON, S.E.

*Any Engine, Pump, Hand or Steam Crane, Hoist, Winding Engine, Mortar Mill, or other Machinery
in Stock may be had ON HIRE.*

MURRAY'S PATENT CHAIN-PUMPS.



Capable of raising 100 to 1000 Gallons per Minute.



From 2000 to 5000 Gallons per Minute.

The total absence of Clacks, Valves, and Packing is the great recommendation to these Pumps, as, on the one hand, no foreign matter, such as weeds, mud, sand, &c., can possibly choke the Pump; and, on the other, a great saving of time is effected by the Pump not having leathers to be renewed, valves re-packed, &c.

I have become a manufacturer of these Pumps, which are well known for their extensive application to Contractors' purposes.

All Sizes are generally in Stock, ready for delivery.

A large Stock of Chain Lifts, Tumblers, Barrels, &c., of MURRAY'S Standard Sizes kept in Stock, and of the best Material and Workmanship possible, for renewals to any Chain Pump of this description.

The wearing parts of the Chain are Steeled in all the Sizes of Pumps.

The Lifts are either of Steel entirely or are Steeled round the Edges. The Small Sizes have Wrought-Iron Closed-back Frames; the Larger Sizes, Cast-Iron Barrels with Faced joint connections.

PRICES.

Size of Pump.	Number of Gallons per Minute.	10 feet high.	Nominal Horse-power for 10 feet high.	For each additional foot in height add
		£		£ s. d.
8 × 4	500	36	1½	2 8 0
10 × 5	700	45	2	3 0 0
12 × 6	1000	54	3	3 12 0
14 × 7	1300	63	4	4 4 0
16 × 8	1600	72	5	4 16 0
24 × 8	2000	105	6	6 0 0
30 × 10	3000	130	9	7 5 0

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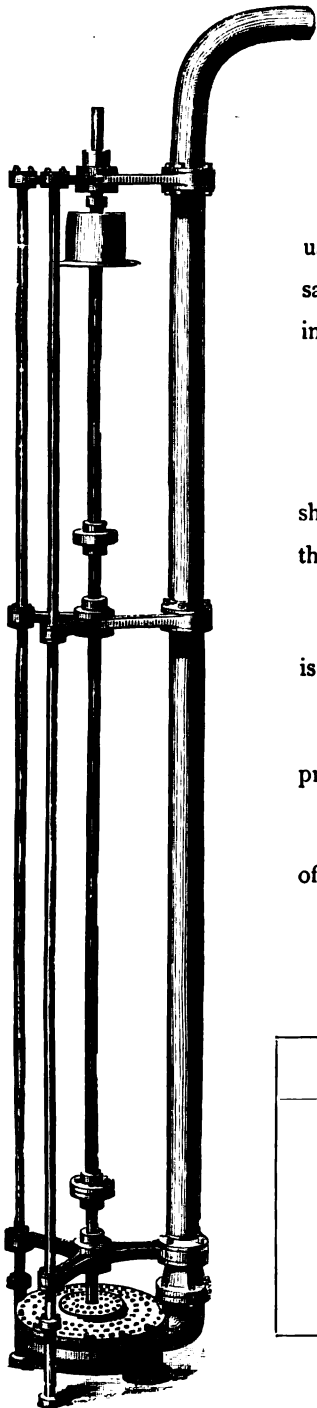
SYKES' IMPROVED CAGE PUMPS.

An extensive experience in the application of Pumps for Contractors' use has led me to construct this new Pump, which has given general satisfaction, and has the greatest approval of Contractors of experience in Pumps for their works. Its advantages are as follows :

1. It will pump in a depth of 9 inches of water.
2. The framework is light and well adapted for sinking : the driving shaft being made from cast steel, makes this part lighter and stronger than from iron shafting.
3. The Pump cannot possibly choke : any matter which gets into it is at once discharged.
4. There are no valves to the Pump, and it does not require priming.
5. A decided increase in its discharge of water at a less expenditure of power over any Pump of similar character.

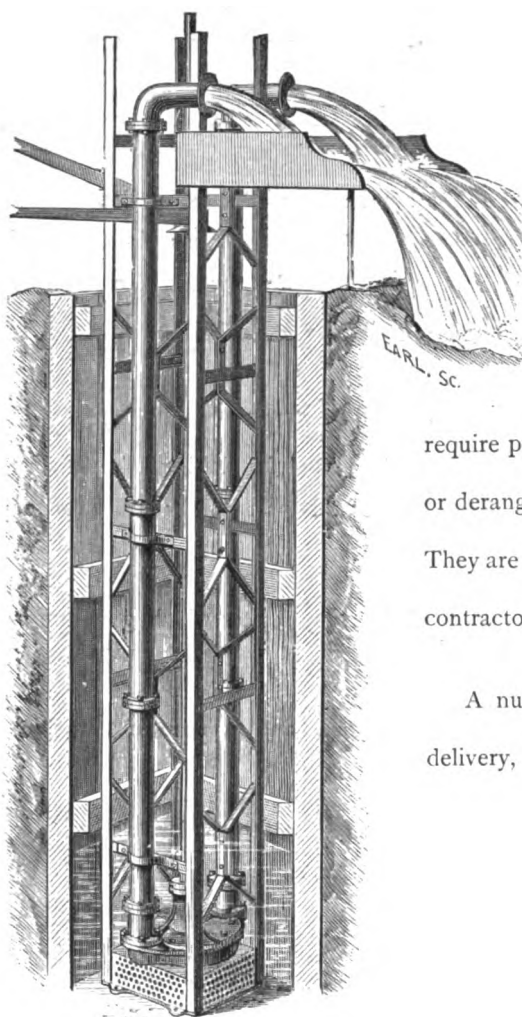
PRICES.

No	No. of Gallons discharged per Minute.	Price for the first 10 feet.	Price of each additional 9-feet length afterwards.		
1	250	£ 30	£	s.	d.
2	400	42	8	0	0
3	600	52	9	0	0
4	1000	60	10	10	0
5	1700	80	11	0	0
			13	0	0



HENRY SYKES, 66, BANKSIDE, LONDON, S.E.

Any Engine, Pump, Hand or Steam Crane, Hoist, Winding Engine, Mortar Mill, or other Machinery in Stock may be had ON HIRE.



CENTRIFUGAL PUMPS

(WOODFORD'S).

These Pumps are simple, and not liable to get out of order, having no valves. They do not require priming before starting, and are not subject to stoppage or derangement by the admission of stones, or other substances. They are suitable for bridge, embankment work, and for general contractors' purposes.

A number of these Pumps are kept in stock ready for delivery, for hiring, and other purposes.

PRICES.

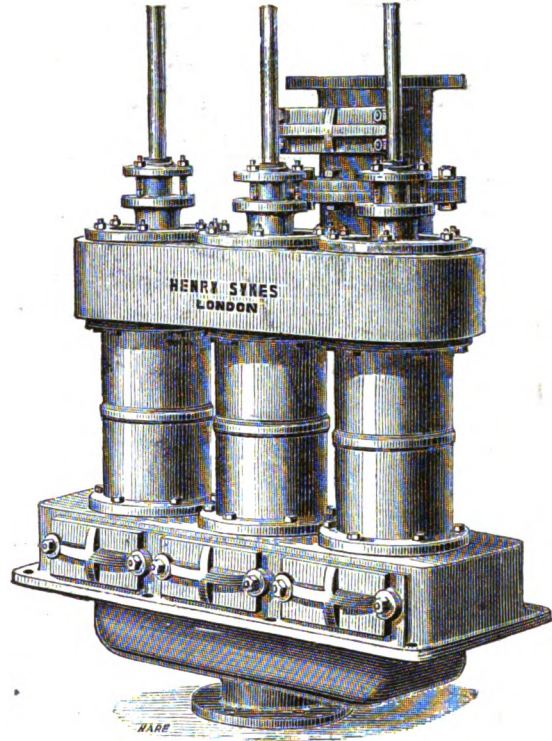
Gallons discharged per Minute.	Diameter of Pipes.	For 10 feet high.			Each extra 9-feet length of Framing, Shafting, &c.		
£	inches.	£	s.	d.	£	s.	d.
500	3½	42	10	0	9	0	0
1000	4½	54	10	0	10	5	0
1500	5½	66	10	0	12	12	0
2000	6½	85	0	0	13	10	0
3000	8½	121	0	0	15	5	0
5000	10½	181	10	0	18	5	0

HENRY SYKES, 66, BANKSIDE, LONDON, S.E.

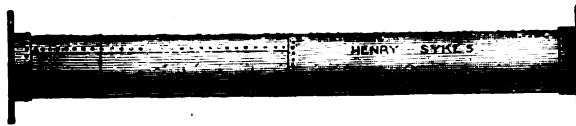
Any Engine, Pump, Hand or Steam Crane, Hoist, Winding Engine, Mortar Mill, or other Machinery in Stock may be had ON HIRE.

LIFT AND FORCE PUMPS.

I have made and fixed Pumps of this sort, with barrels up to 12 inches in diameter, in connection with Horizontal Fixed Engines ; and shall be glad to give prices and particulars to intending purchasers.



STOUT WROUGHT-IRON RIVETED FLANGED PIPES.

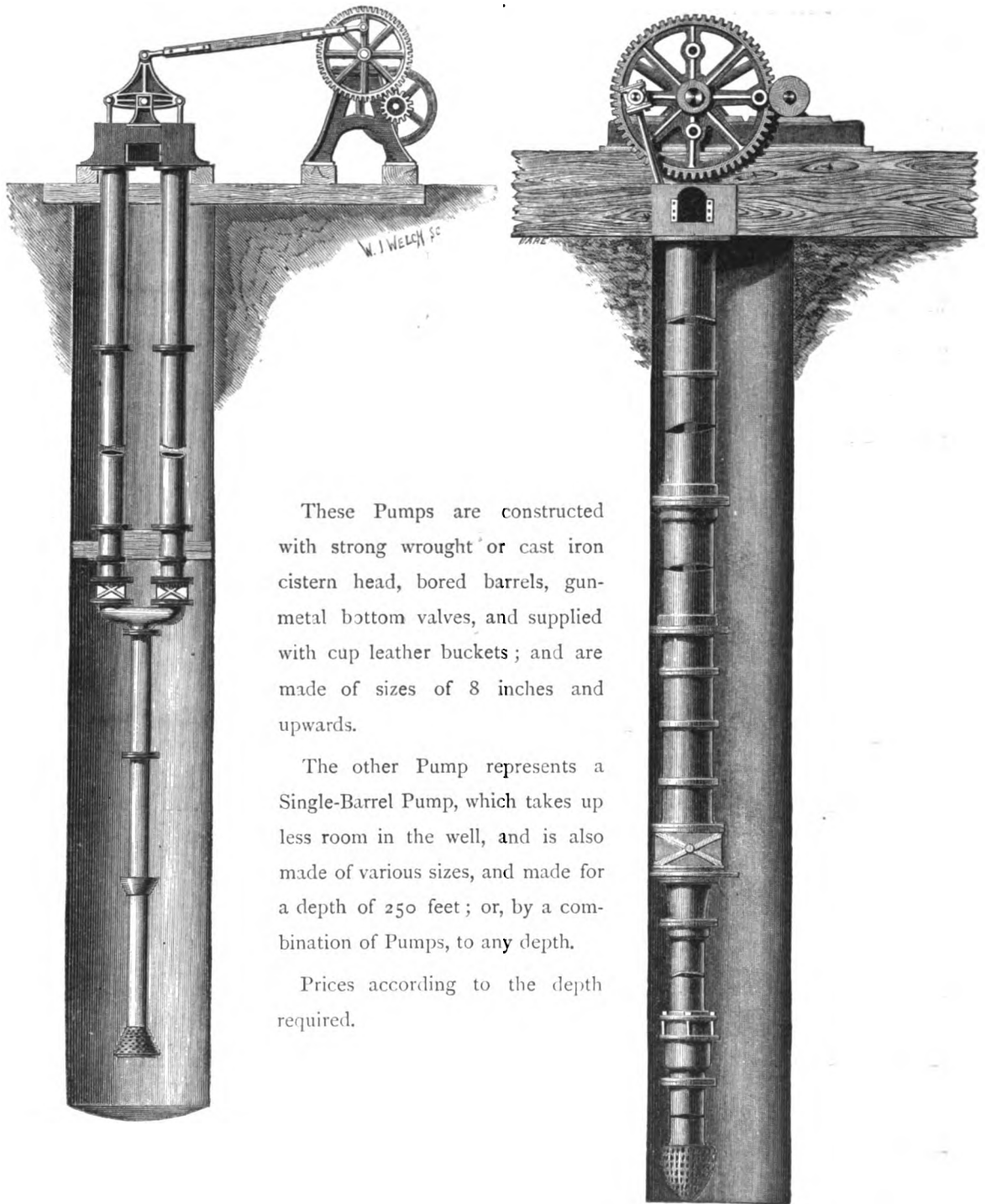


Length of Pipe.	Diameter of Pipe in Inches.																							
	4"			5"			6"			7"			8"			9"			10"			12"		
3 feet	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
6 "	1	1	0	1	10	0	1	16	0	2	8	0	3	17	0	4	10	0	5	10	0	7	10	0
9 "	1	17	0	2	2	0	2	14	0	3	15	0	5	3	0	6	15	0	9	10	0	10	10	0
	2	13	0	3	0	0	3	17	0	6	10	0	7	17	0	9	10	0	11	10	0	17	10	0

HENRY SYKES, 66, BANKSIDE, LONDON, S.E.

Any Engine, Pump, Hand or Steam Crane, Hoist, Winding Engine, Mortar Mill, or other Machinery in Stock may be had ON HIRE.

DEEP-WELL PUMPS.



These Pumps are constructed with strong wrought or cast iron cistern head, bored barrels, gun-metal bottom valves, and supplied with cup leather buckets; and are made of sizes of 8 inches and upwards.

The other Pump represents a Single-Barrel Pump, which takes up less room in the well, and is also made of various sizes, and made for a depth of 250 feet; or, by a combination of Pumps, to any depth.

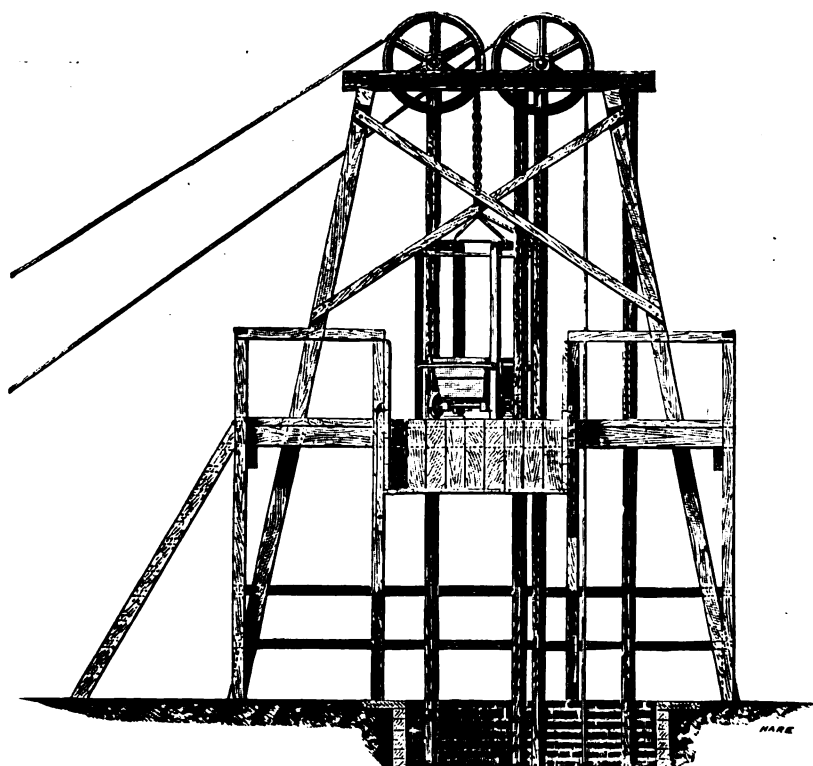
Prices according to the depth required.

HENRY SYKES, 66, BANKSIDE, LONDON, S.E.

Any Engine, Pump, Hand or Steam Crane, Hoist, Winding Engine, Mortar Mill, or other Machinery in Stock may be had ON HIRE.

DEEP-WELL PUMP.

PIT-HEAD GEAR.

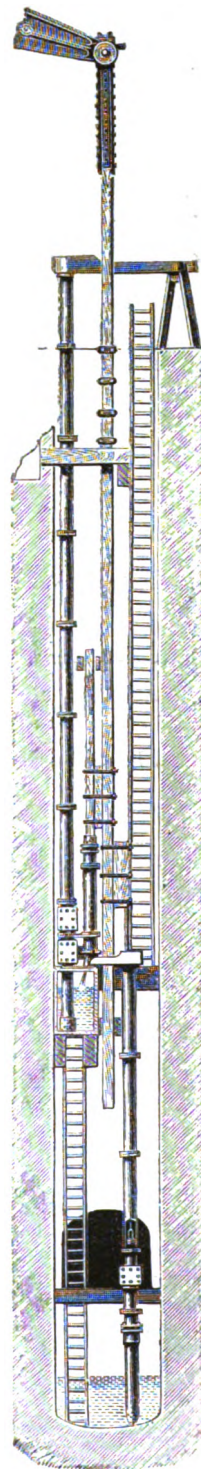


SPECIFICATIONS AND PRICES

OF THIS

DEEP-WELL PUMPING MACHINERY, AND PIT-HEAD
WINDING GEAR,

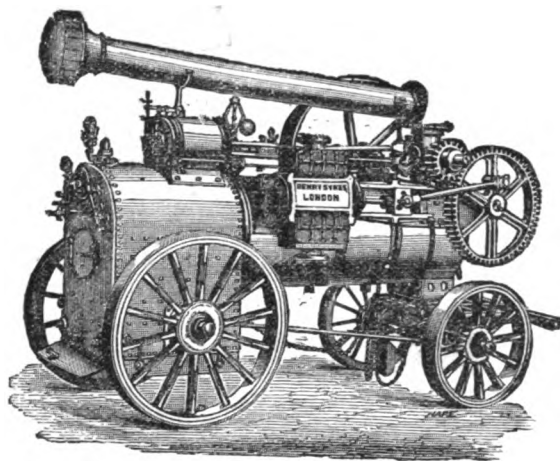
MAY BE HAD UPON APPLICATION.



HENRY SYKES, 66, BANKSIDE, LONDON, S.E.

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in Stock may be had ON HIRE.*

STEAM PUMPING ENGINE.



The Illustration represents a Portable Engine arranged in connection with a powerful Double-Action Lift and Force Pump. The Pump Barrel is lined with Gun Metal, and the valve seats and guards are of the same material; the valves are of indiarubber. The Engine can be used for any other work for which an ordinary Portable is adapted.

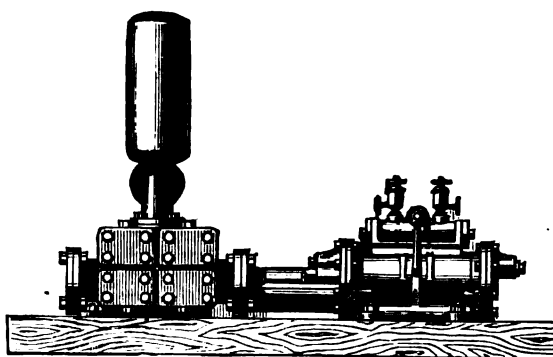
Horse-Power.	Diameter of Cylinder in Inches.	Diameter of Pump Barrel.	Water raised per Hour in Gallons.
5 8	7 9	6" 8"	8000 14500

Suction and Delivery Pipe extra.

Present Prices on application.

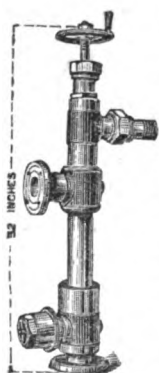
SEVERAL OF
THESE PUMPS ARE

KEPT



IN STOCK
FOR HIRING
PURPOSES.

INJECTORS.



No. of Injector.	For Lift and Force. Prices at the Works. Constructed to Lift their Water from a Lower Level.				For Force only. Prices at Works. Not to Lift.				Internal Diameter of Pipes.	STEAM PRESSURE.											
	Brass.		Iron.		Brass.		Iron.			30lb.	40lb.	50lb.	60lb.	70lb.	80lb.	90lb.	100lb.	110lb.	120lb.	130lb.	140lb.
	1.	2.	3.	4.	5.	6.	7.	8.													
	£	s.	£	s.	£	s.	£	s.													
A	3	10	..	..	2	5	..	..	$\frac{1}{2}$	47	53	63	65	71	76	80	85	89	93	97	100
B	3	15	..	..	2	10	..	..	$\frac{3}{4}$	104	120	135	148	160	170	181	190	200	210	218	226
C	6	5	..	..	4	5	..	..	1	290	335	375	410	444	475	503	529	557	581	604	627
D	8	15	6	5	6	0	3	15	1	418	482	540	592	638	682	724	762	800	836	867	903
E	12	0	8	10	8	5	6	0	$1\frac{1}{2}$	742	847	958	1050	1100	1213	1287	1357	1424	1486	1544	1605
F	15	0	11	0	10	10	8	5	$1\frac{3}{4}$	1161	1340	1498	1642	1774	1896	2065	2120	2215	2322	2417	2506
G	17	0	13	0	12	0	9	10	2	1405	1621	1813	1988	2159	2293	2433	2565	2691	2809	2925	3036
H	20	0	14	0	..	..	11	0	2	1672	1930	2155	2365	2554	2730	2896	3052	3202	3345	3481	3613
I	25	0	18	0	17	0	14	0	$2\frac{1}{2}$	2275	2525	2935	3220	3480	3710	3940	4150	4360	4550	4737	4917
K	30	0	26	0	22	0	18	0	$2\frac{3}{4}$	2970	3430	3833	4205	4545	4850	5150	5427	5690	5947	6187	6420

HENRY SYKES, 66, BANKSIDE, LONDON, S.E.

Any Engine, Pump, Hand or Steam Crane, Hoist, Winding Engine, Mortar Mill, or other Machinery in Stock may be had ON HIRE.

PORTABLE WROUGHT-IRON CONTRACTORS' HAND PUMPS.

Strong and useful, with Suction Pipes in convenient lengths, and Sliding Suction for sinking; all complete, with Bolts and Packing to 28 feet under Spout.

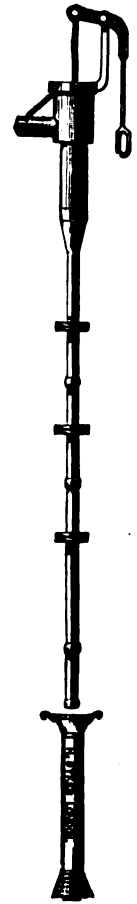
PRICES.

		£	s.	d.
4-inch Barrel		7	17	6
5 „ „		9	0	0
6 „ „		10	15	0
7 „ „		12	17	6

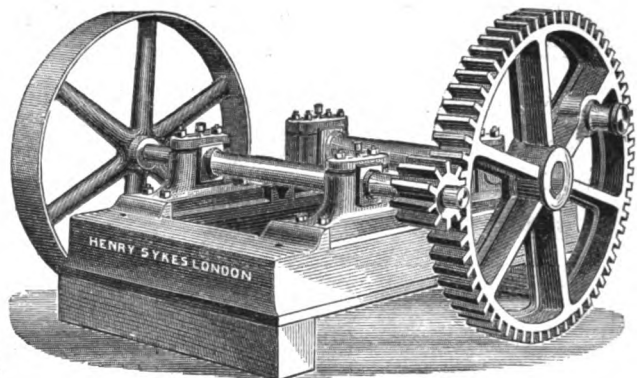
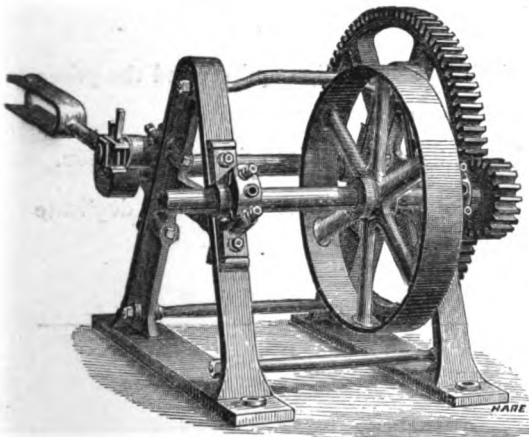
The Prices below show the cost of the above Pump for 7 feet under Spout, the Pipes per foot, and the Sliding Suctions separately:

Diameter of Barrel.	7 feet below Spout.	Pipes per foot.	Sliding Suction, 8 feet long.
inches.	£ s. d.	s. d.	£ s. d.
4	3 0 0	3 6	2 6 0
5	3 9 0	4 0	2 12 0
6	4 6 0	4 10	2 18 0
7	5 3 6	5 6	3 10 0
8	7 10 0	7 0	4 0 0
9	9 4 0	8 9	5 5 0

N.B.—The 8-inch and 9-inch Pumps are 9 feet under Spout, with Sliding Suctions to sink 10 feet long.



INTERMEDIATE GEARING.



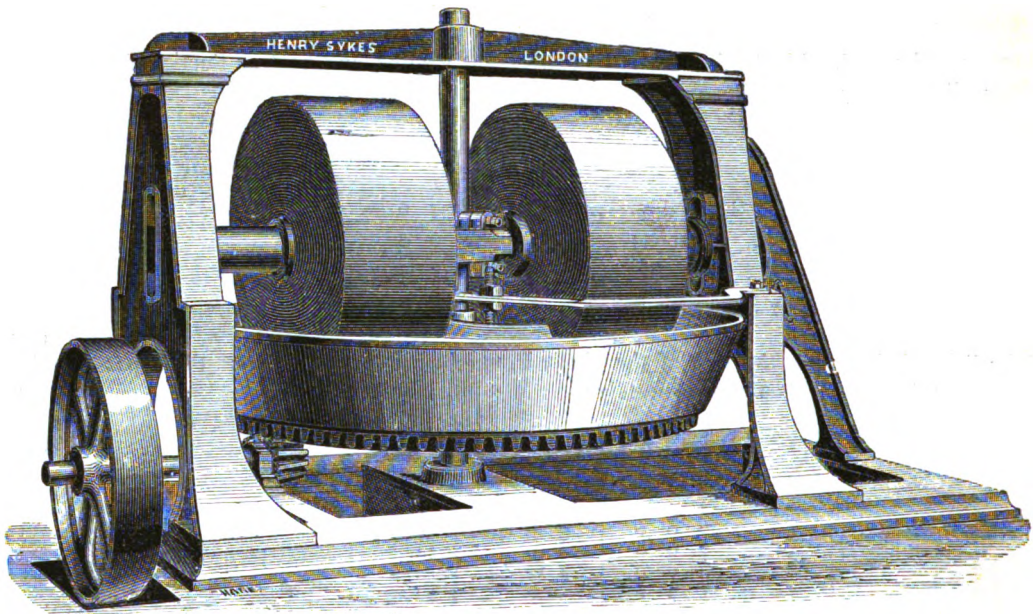
These two Illustrations show different sets of Gear for driving Deep Well and Contractors' Pumps, of various sizes, according to the capacity of the Pumps.

Prices and further particulars on application.

HENRY SYKES, 66, BANKSIDE, LONDON, S.E.

Any Engine, Pump, Hand or Steam Crane, Hoist, Winding Engine, Mortar Mill, or other Machinery in Stock may be had ON HIRE.

MORTAR MILLS.



All the Mortar Mills for the "District," and nearly all for the Metropolitan Railways, as well as for many other Works, were supplied by me, of similar construction to the one here represented, but the base of the standards is now extended and other improvements introduced to make the Mill more rigid when working.

Both the Pan and Rollers revolve, as will be understood by reference to the Woodcut.

The Pans are fitted with loose bottom plates, so that when worn out these can be renewed at little cost.

The Mill, as shown, has a metal foundation plate: this is not generally required, and the prices quoted are for Mills without it.

All necessary bolts are supplied with each Mill to fit it together and bolt it to timber foundation.

About twenty of these Mills are always kept ready, also false bottoms and other duplicate wearing parts.

PRICES.

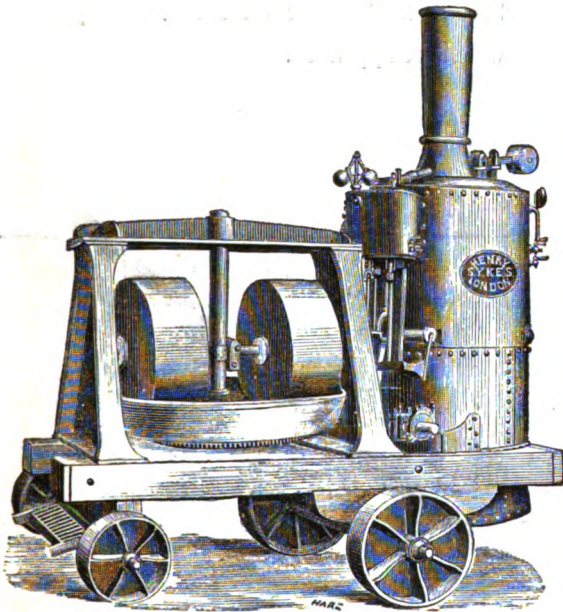
Diameter of Pan at top.		Size of Rollers.				Price.
ft.	in.	ft.	in.	×	in.	£
5	0	2	8	×	10	44
6	0	3	0	„	12	50
7	0	3	6	„	16	72
7	6	3	6	„	16	80
9	0	3	6	„	22	118

HENRY SYKES, 66, BANKSIDE, LONDON, S.E.

Any Engine, Pump, Hand or Steam Crane, Hoist, Winding Engine, Mortar Mill, or other Machinery in Stock may be had ON HIRE.

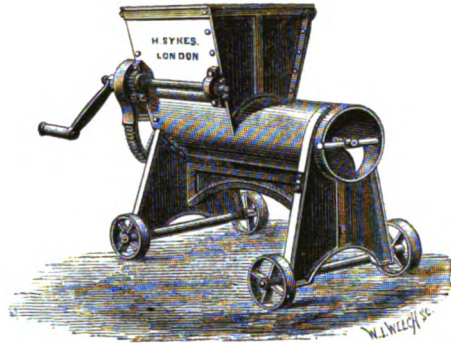
PORTABLE MORTAR MILLS.

The price of these Portable Mortar Mills, with 5-feet pans, complete, with Mill Engine and Frame, and mounted on wheels, is £130; and for 6-feet Mill with larger Engine, £150.



HAND MORTAR MILL.

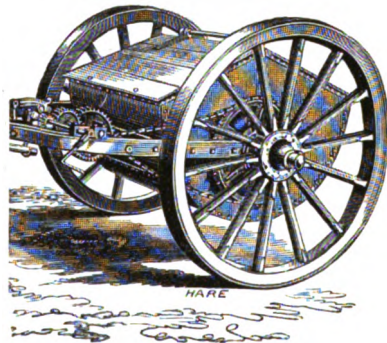
Price, complete, £9 each.



IMPROVED MORTAR CART.

The body of this Cart is made of Wrought-Iron Plates, and is perfectly water-tight.

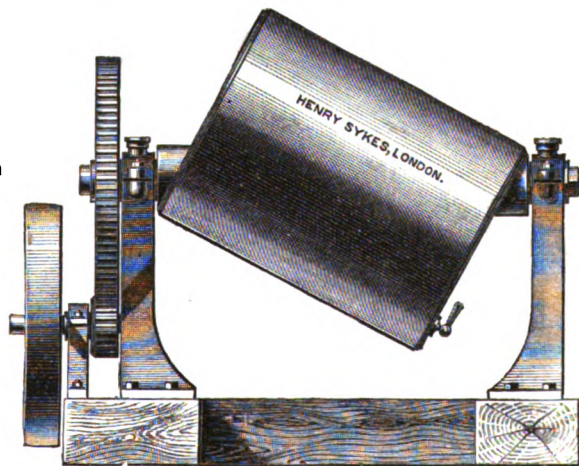
Small size, £26 10s.
Large „ £35 10s.



CONCRETE MIXERS.

Prices of Concrete Mixers, with Wrought-Iron Cylinders, to hold

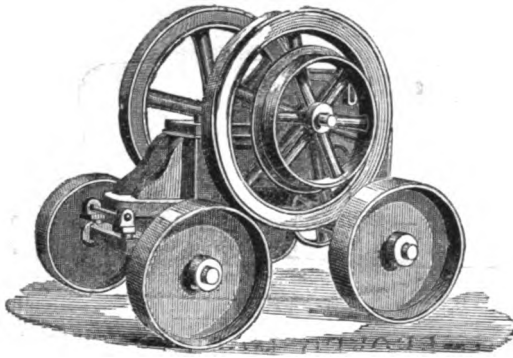
$\frac{1}{3}$ yard	..	..	£38
$\frac{1}{2}$ „	..	..	44
$\frac{3}{4}$ „	..	..	48
1 „	..	..	56



HENRY SYKES, 66, BANKSIDE, LONDON, S.E.

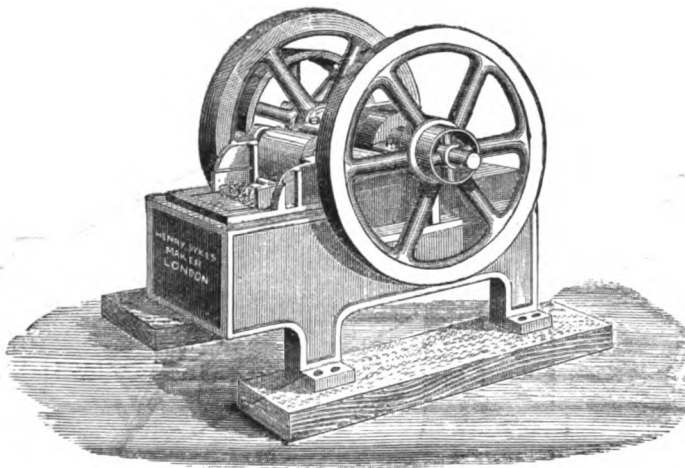
Any Engine, Pump, Hand or Steam Crane, Hoist, Winding Engine, Mortar Mill, or other Machinery in Stock may be had ON HIRE.

STONE BREAKERS.



Since the expiry of Blake's Patent, I have become a Maker of these Machines, prices of which are appended.

Machiae on Wheels.	Prices.	Weight of Machine.	Quantity of Metal produced per Hour.	H.-P. required to drive.	Price of Vertical Engines.
6 × 4	£75	2 tons 6 cwt.	2 tons	2½ H.-P.	£100
10 „ 7	150	5 „ 5 „	4 „	4 „	130
15 „ 7	185	6 „ 12 „	6 „	6 „	175
20 „ 9	250	8 „ 16 „	8 „	8 „	215



The product of the Machines without wheels and the horse-power to drive them is the same as the above.

Prices of Machines without wheels.

10 × 7	£130
15 „ 7	£170
20 „ 9	£220

If the Machines are supplied with Screens, they are £10 extra for any size.

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CIRCULAR-SAW BENCHES.

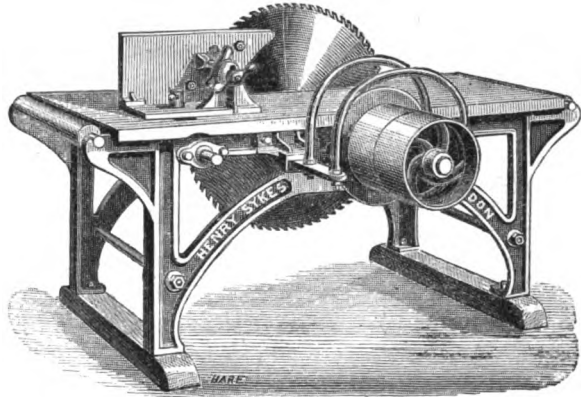
THE FRAMES are of Iron, extra strong, with *Planed Iron Tables*.

THE CIRCULAR SAWS are the best Machine Ground, and are efficiently steadied in the Table.

THE SAW SPINDLES run in extra long Brass Conical Bearings, with Adjustable Carriages.

THE DRIVING PULLEYS are of suitable size and width to be driven direct from the Fly Wheel of a Portable Engine if required.

THE PARALLEL FENCES slide on a strong Turned Bar, and can be adjusted with the greatest accuracy to a Scale marked on the Table. They also have Slide Plates fitted on face, to adapt them to Saws of various sizes.



IRON ROLLERS are fixed at the ends of Nos. 2 and 3 Tables, to facilitate the moving of the Timber.

These Benches, when required, can be fitted with any or all of the following Appliances:

DIAGONAL MOTION attached to the Parallel Fences for Feather-edge Cutting.

LOOSE PULLEY AND STRAP THROWING-OFF GEAR, with Lever under handy control.

BORING APPARATUS, with four Patent Boring Bits, conveniently arranged at opposite end of Spindle to Driving Pulleys.

BORING TABLE, working in a Sliding Column, fitted with a Cross Slide to ensure accuracy in boring, and regulated by a Hand Wheel and Screw to any required distance from centre of Bit.

PRICES:

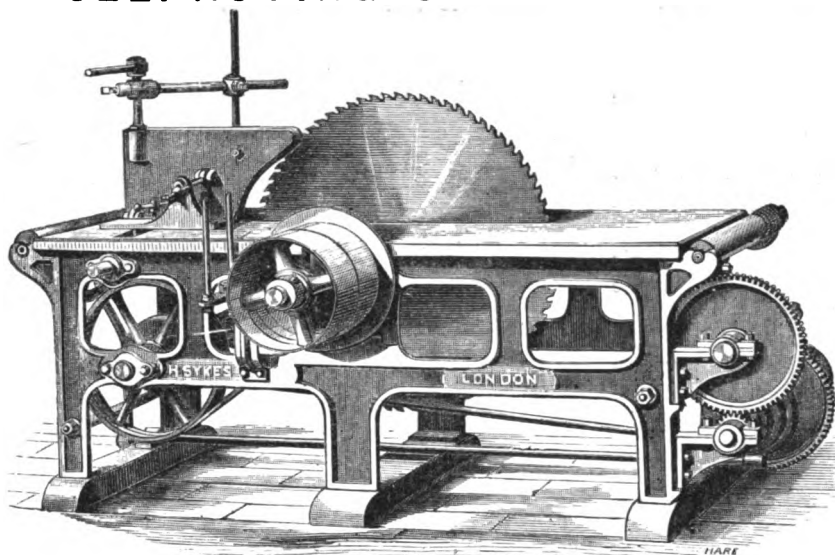
Including One Saw, as specified.

		£	s.	d.
<i>No. 1.—Table 4 feet long by 2 feet broad, fitted with 24-inch Saw</i>		18	0	0
Loose Pulley and Throwing-off Gear, extra	£1 10 0			
Diagonal Motion to Fence, extra	0 10 0			
Boring Apparatus and 4 Boring Bits, extra	1 10 0			
Boring Table, extra	2 10 0			
Packed for Shipment, in closed Case, extra	0 12 0			
Dimensions of Case, 14 feet cube. Weight, 6 cwt.				
<i>No. 2.—Table 5 feet long by 2 feet 6 inches broad, fitted with 30-inch Saw, but capable of taking a 36-inch Saw</i>		24	0	0
Loose Pulley and Throwing-off Gear, extra	£1 15 0			
Diagonal Motion to Fence, extra	0 15 0			
Boring Apparatus and four Boring Bits, extra	1 10 0			
Boring Table, extra	3 0 0			
Packed for Shipment, in closed Case, extra	0 16 6			
Dimensions of Case, 26 feet cube. Weight, packed, 13 cwt.				
<i>No. 3.—Table 6 feet long by 2 feet 8 inches broad, fitted with 36-inch Saw, but capable of taking a 42-inch Saw</i>		35	0	0
Loose Pulley and Throwing-off Gear, extra	£2 0 0			
Diagonal Motion to Fence, extra	0 15 0			
Boring Apparatus and four Boring Bits, extra	1 10 0			
Boring Table, extra	3 10 0			
Packed for Shipment, in closed Case, extra	1 5 0			
Dimensions of Case, 46 feet cube. Weight, 22 cwt.				

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SELF-ACTING CIRCULAR-SAW BENCHES.



These Benches are on the same principle as those described on page 289, but of much stronger construction throughout, and are fitted with Self-Acting Feed Motion for drawing up the timber to the Saw at speeds varying from 10 to 60 feet per minute. They are also provided with Fast and Loose Pulleys, Strap Throwing-off Gear, and Spring Rollers to the Fences (to ensure accuracy in Deal Cutting), inclusive in the price.

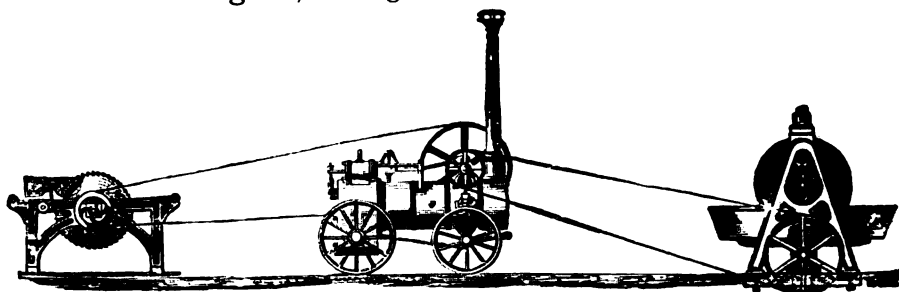
PRICES:

.. Including One Saw, as specified.

	£	s.	d.
<i>No. 4.—Table 6 feet long by 2 feet 8 inches broad, fitted with 36-inch Saw, but capable of taking a 42-inch Saw, complete, as specified</i>	62	0	0
Boring Apparatus and Bits, extra	£2	0	0
Boring Table, extra	3	10	0
Packed for Shipment, in closed Case, extra	1	15	0
Dimensions of Case, 52 feet cube. Weight, 24 cwt.			
<i>No. 5.—Table 8 feet long by 3 feet broad, fitted with 42-inch Saw, but capable of taking a 48-inch Saw, complete, as specified</i>	76	0	0
Boring Apparatus and Bits, extra	£2	0	0
Boring Table, extra	4	0	0
Packed for Shipment, in closed Case, extra	2	5	0
Dimensions of Case, 93 feet cube. Weight, 38 cwt.			

TIMBER RAILS AND TRUCKS. When required for cutting long timber, Rails and Carriages mounted on turned wheels, for supporting the timber and guiding it true to the saw, are supplied at the extra price of £15.

Portable Engine, driving Mortar Mill and Circular-Saw Bench.



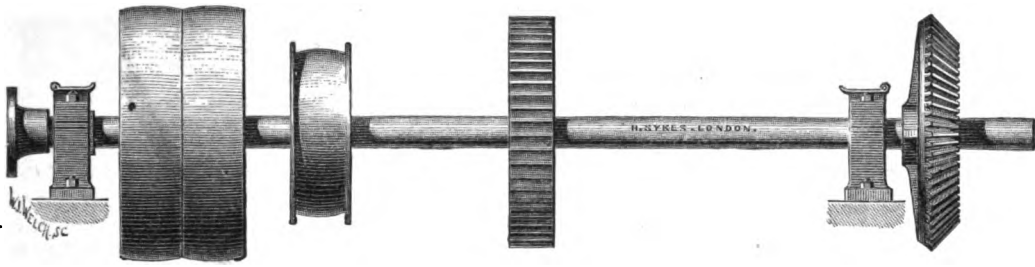
The above Illustration shows a Portable Engine working a Mortar Mill and a Circular-Saw Bench; the latter being driven from the Engine Fly-Wheel and the Mortar Mill from a Pulley fitted to opposite end of Crank Shaft. The machines may be worked either both at one time or separately, as desired.

An arrangement of this kind is often of the greatest advantage to Contractors, Builders, and others; and the Engine, when not wanted for the works named, may be readily applied to Pumping, or any other purpose to which steam power is applicable.

HENRY SYKES, 66, BANKSIDE, LONDON, S.E.

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PULLEYS AND SHAFTING.



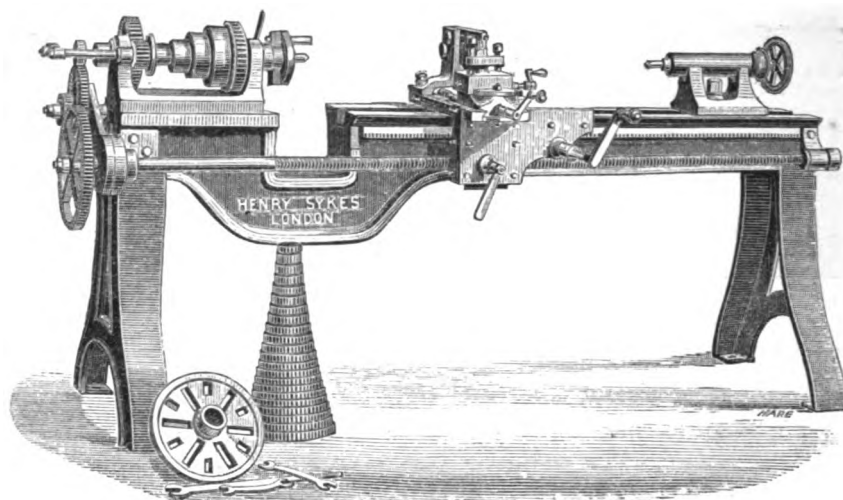
PRICES OF PULLEYS TURNED AND BORED.

Diameter in Inches.	INCHES BROAD.									
	4	5	6	7	8	9	10	11	12	
10	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
11	10 0	12 6	14 0	16 6	18 6	19 6	20 0	23 0	24 0	24 0
12	11 6	13 6	15 0	17 9	19 6	21 6	22 6	25 0	26 0	26 0
13	12 6	14 6	16 0	18 9	20 6	24 0	24 0	27 0	28 0	28 0
14	13 6	15 6	17 0	20 0	22 0	24 0	25 6	29 0	30 0	30 0
15	14 6	16 6	18 6	21 0	24 0	26 0	27 0	31 0	33 0	33 0
16	15 6	17 6	19 6	22 0	26 0	28 0	29 0	33 0	35 0	35 0
17	17 0	18 6	21 0	23 6	28 0	30 0	31 0	35 0	37 0	37 0
18	17 6	19 6	22 0	25 0	30 0	31 0	33 0	37 0	39 0	39 0
19	18 9	20 6	23 6	26 0	32 0	33 6	35 0	39 0	41 0	41 0
20	19 3	21 6	24 6	27 6	34 0	35 0	37 0	41 0	43 0	43 0
21	20 0	23 0	25 9	29 0	35 6	37 0	39 0	43 0	46 0	46 0
22	21 0	24 0	28 0	30 6	36 6	39 0	41 0	48 0	50 0	50 0
23	22 0	25 0	30 0	33 0	38 0	41 0	43 0	50 0	54 0	54 0
24	23 0	26 0	31 3	35 0	40 0	43 0	48 0	52 0	56 0	56 0
25	24 0	27 0	32 9	37 0	42 0	45 6	50 0	54 0	58 0	58 0
26	25 0	28 0	34 0	39 0	44 0	49 0	52 0	56 0	60 0	60 0
27	26 0	30 0	36 0	40 6	46 0	50 0	54 0	58 0	62 0	62 0
28	27 0	31 0	37 6	42 0	48 0	52 0	56 0	61 0	66 0	66 0
29	28 0	32 0	38 6	44 0	50 0	54 0	58 0	63 0	69 0	69 0
30	29 6	33 0	39 6	45 6	52 0	56 0	60 0	65 0	71 0	71 0
31	31 6	34 6	41 0	47 0	54 0	58 0	62 0	67 0	73 0	73 0
32	32 6	36 0	42 6	48 3	56 0	60 0	64 0	69 0	75 0	75 0
33	33 6	37 0	43 6	50 0	58 0	62 0	66 0	71 0	77 0	77 0
34	34 6	38 0	45 0	52 0	60 0	64 0	68 0	73 0	79 0	79 0
35	36 0	39 0	46 6	54 0	61 6	65 6	70 0	75 0	81 0	81 0
36	37 0	40 0	48 0	55 0	63 0	67 0	72 0	77 0	84 0	84 0
37	38 0	41 6	49 0	56 0	64 0	69 0	74 0	79 0	86 0	86 0
38	39 0	42 6	50 0	57 6	66 0	70 6	76 0	82 0	88 0	88 0
39	40 0	43 6	51 6	59 0	68 0	72 0	78 0	85 0	90 0	90 0
40	41 0	44 6	52 9	60 6	70 0	73 0	80 0	88 0	93 0	93 0
41	42 0	45 6	54 0	62 0	71 0	75 0	82 0	90 0	96 0	96 0
42	43 0	47 6	56 0	64 0	72 0	77 0	84 0	93 0	99 0	99 0
43	44 0	48 9	58 0	66 0	73 0	79 0	86 0	96 0	102 0	102 0
44	45 0	50 6	60 0	68 0	74 0	81 0	89 0	99 0	105 0	105 0
45	46 0	51 6	61 0	69 0	75 0	83 0	91 0	102 0	108 0	108 0
46	47 0	53 6	62 0	70 6	77 0	85 0	95 0	105 0	111 0	111 0
47	48 0	54 6	63 0	72 0	78 0	87 0	97 0	107 0	114 0	114 0
48	49 0	56 0	64 6	73 0	80 0	90 0	99 0	109 0	116 0	116 0
54	50 0	57 0	66 6	75 0	82 0	92 0	101 0	110 0	118 0	118 0
60	55 0	62 6	74 0	84 0	95 0	102 0	113 0	120 0	130 0	130 0
72	63 0	71 0	83 0	101 0	103 0	114 0	123 0	135 0	144 0	144 0
	84 0	96 0	114 0	126 0	138 0	150 0	162 0	175 0	186 0	186 0

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in Stock may be had ON HIRE.*

LATHES.



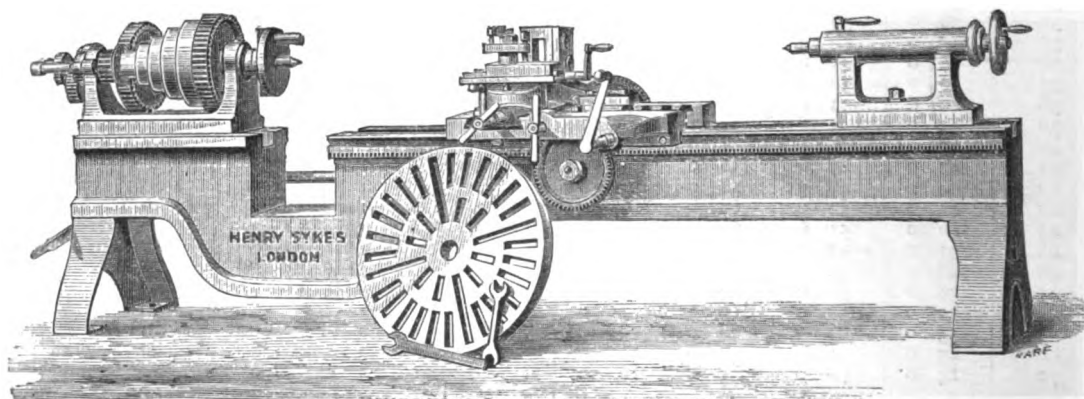
The Tools illustrated and described below are made from the pattern of the known best makers of their class.

Purchasers may have an opportunity of seeing some of the Tools at work at 66, Bankside, and satisfying themselves as to their character and completeness.

Any Tool in work may be had at the quoted prices.

SELF-ACTING SLIDE AND SURFACING LATHES.

Height of Centres.	Length of Bed.	Will admit between the Centres.	Gap will admit		Price.	Extra, if Screw Cutting.
inches.	feet.	feet.	diam.	wide.	£	£
6	6	3½	24	× 8	65	10
8	10	6	36	„ 12	85	12
10	14	9	42	„ 14	110	15
12	16	11	48	„ 18	135	18
15	16	12	60	„ 18	195	25



HENRY SYKES, 66, BANKSIDE, LONDON, S.E.

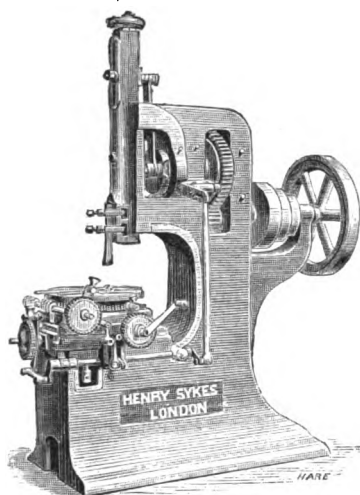
Any Engine, Pump, Hand or Steam Crane, Hoist, Winding Engine, Mortar Mill, or other Machinery in Stock may be had ON HIRE.

SLOTING MACHINES.

PRICES.

Length of Stroke.	Will admit in Diameter.		Price.
inches.	ft.	in.	£
5	1	6	64
9	3	6	130

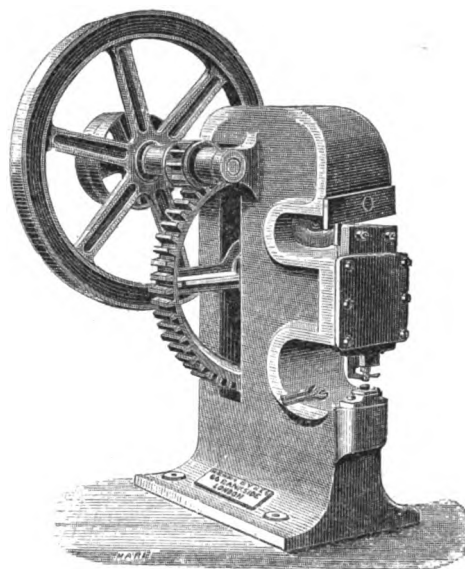
All fitted with Self-acting Slides, Self-acting Circular Table with Self-acting and Independent Feeds, Adjustable Stroke, &c., and the last five are fitted with arrangement for slotting taper work.



PUNCHING AND SHEARING MACHINES.

To Punch and Shear Plates.	Distance from the Edge.	Price.
inch thick.	inches.	£
$\frac{3}{4}$	14	60
1	20	220

All fitted with one Punch and Die, and one pair Cast-Steel Shears.

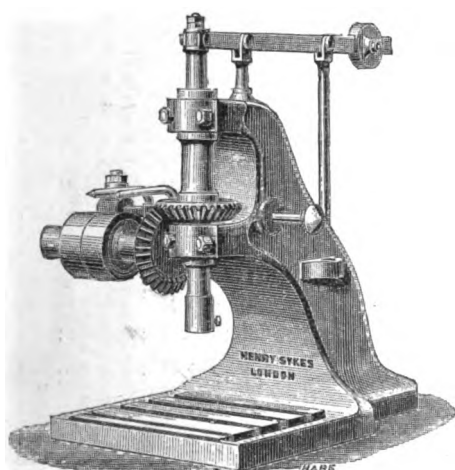


DRILLING MACHINES.

Will admit in Diameter in front of Pillar.		Will bore holes diam. deep.		Price.	
ft.	in.	in.	in.	Double Geared.	Single Geared.
2	4	3	10	65	55
3	0	6	14	95	..
4	0	12	18	135	..

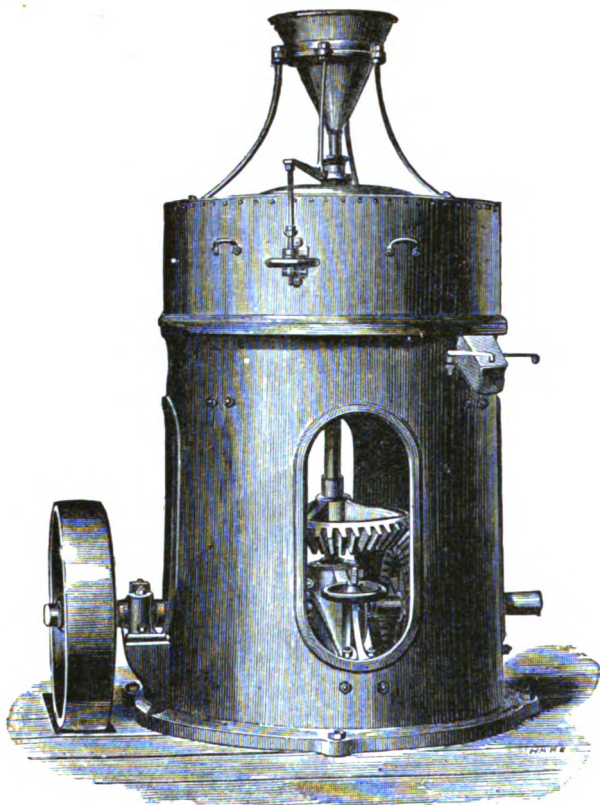
All fitted with Overhead Motion, Rising Swing Table, Screw Keys, &c.

Small Ungeared Drilling Machine, on Stand, to bore holes up to $\frac{1}{2}$ inch diameter by 3 inches deep, with Rising Table, &c., £21.



HENRY SYKES, 66, BANKSIDE, LONDON, S.E.

Any Engine, Pump, Hand or Steam Crane, Hoist, Winding Engine, Mortar Mill, or other Machinery in Stock may be had ON HIRE.



GRINDING MILLS,

IN CYLINDRICAL OR CONTINUOUS IRON FRAMES,

FOR GRINDING WHEAT, BARLEY, AND OTHER PRODUCE.

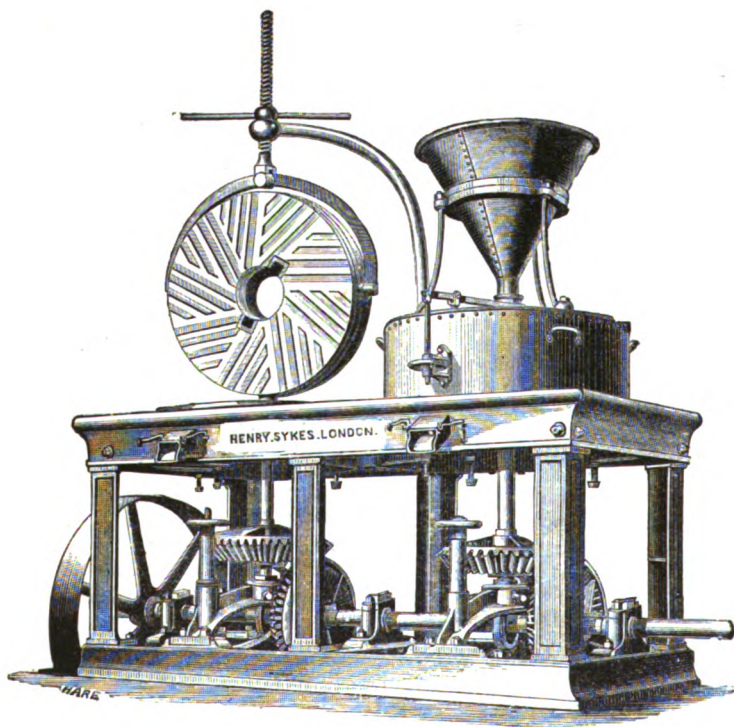
The Single Mills are constructed in Cylindrical Iron Frames, as illustrated. When two or more pairs are required connected together, they are fixed in strong continuous Iron Framing: any number up to six pairs can be constructed in this manner, and driven from one lay shaft.

These Mills embody the following important advantages and improvements:

1. Self contained in Cast-Iron Frame, requiring no Foundations or connections to Buildings.
2. Very compact and steady in work.
3. Ready method of Driving by means of the large Pulley fixed on horizontal Shaft of Mill, either direct from a Portable Engine or other motive power, or from a line of shafting.
4. Handy adjustments for regulating the Fineness of Grinding, and the supply of Grain to the Stones.
5. The Feeding Motion is Noiseless.
6. The Stone-Case, Hopper, and Stand are all Iron, are consequently much more durable, and not affected by climate.

English Grey Stones are suitable for grinding Barley, crushing Oats, or kibbling Beans; but for producing Fine Wheaten Flour, French Stones are necessary.

In some instances Grey Runner Stones, with French Bed Stones, are preferred for general purpose Mills. The French Beds, being much harder, are more durable, and Mills so fitted will grind either Wheat or Barley.



PRICES PER PAIR.

	4 ft.	3 ft. 6 in.	3 ft.	2 ft. 8 in.	2 ft. 2 in.
Fitted with Derbyshire Grey Stones	£ 80 0	£ 66 0	£ 55 0	£ 48 0	£ 37 0
Fitted with French Bed and Grey Runner	90 0	75 0	61 0	53 0	41 0
Fitted with French Burr Stones	104 0	82 0	68 0	58 0	44 0
Crane for lifting Stones	7 0	7 0	7 0	7 0	7 0
Packing for Shipment	3 15	3 5	2 10	2 0	1 15
Produce per hour:					
Fine Flour .. Bushels	5	3½	3	2½	2
Coarse Flour .. "	10	8	6	4½	3½

HENRY SYKES, 66, BANKSIDE, LONDON, S.E.

Any Engine, Pump, Hand or Steam Crane, Hoist, Winding Engine, Mortar Mill, or other Machinery in Stock may be had ON HIRE.

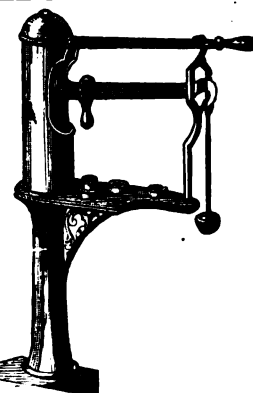
PORTABLE WEIGHING MACHINES.

MOUNTED ON TRAVELLING WHEELS.

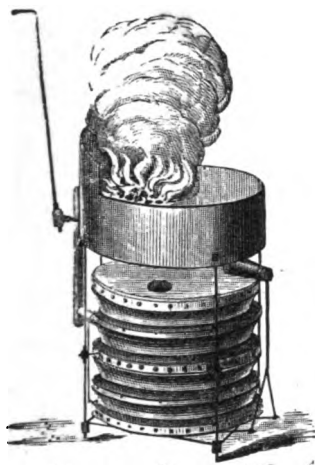
	Size of Platform.	£	s.
To weigh 3 cwt. ..	22 × 20 in. ..	4	0
" 4 " ..	22 " 22 " ..	5	0
" 5 " ..	26 " 22 " ..	5	15
" 7 " ..	26 " 26 " ..	7	0
" 10 " ..	30 " 30 " ..	8	0
" 12 " ..	31 " 31 " ..	9	10
" 15 " ..	34 " 34 " ..	11	0

WITHOUT WHEELS.

	Size of Platform.	£	s.
To weigh 3 cwt. ..	22 × 20 in. ..	3	17
" 4 " ..	22 " 22 " ..	4	17
" 5 " ..	26 " 22 " ..	5	12
" 7 " ..	26 " 26 " ..	6	17
" 10 " ..	30 " 30 " ..	7	17
" 12 " ..	31 " 31 " ..	9	5
" 15 " ..	34 " 34 " ..	10	17

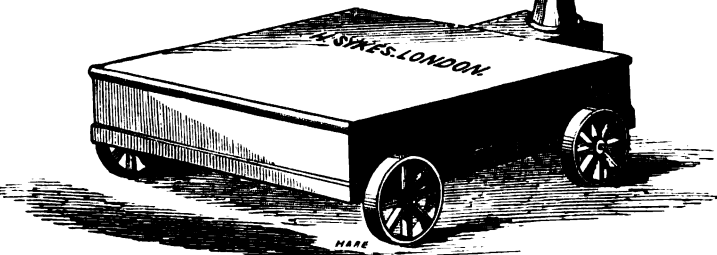


PATENT CIRCULAR PORTABLE FORGE.



PRICES.

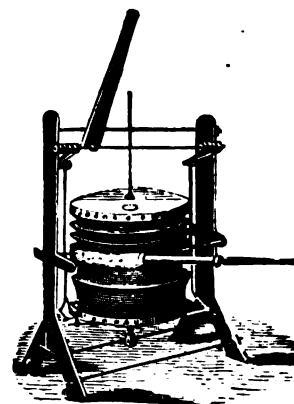
16 inches	.. ..	£5 2 each.
18 "	.. ..	5 15 "
20 "	.. ..	6 15 "



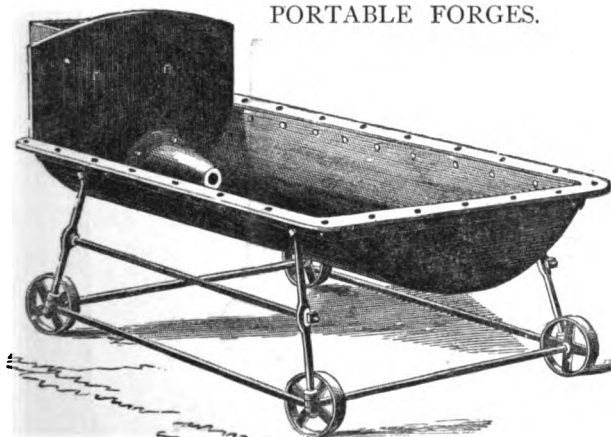
IMPROVED CIRCULAR BELLOWS, SINGLE BLAST.

PRICES.

16 inches, complete..	.. ..	£4 5
18 " " " " " "	.. ..	5 2
20 " " " " " "	.. ..	5 15
22 " " " " " "	.. ..	6 10
24 " " " " " "	.. ..	7 4
26 " " " " " "	.. ..	8 5
28 " " " " " "	.. ..	9 15
30 " " " " " "	.. ..	10 0
32 " " " " " "	.. ..	12 2
34 " " " " " "	.. ..	14 0
36 " " " " " "	.. ..	15 10



PORTABLE FORGES.



Price of the above, complete, £13.

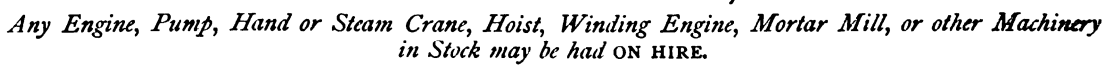
PORTABLE VICE-STANDS.



Fitted with Vice, and strong Wood Tool-Box below. Price £8.

HENRY SYKES, 66, BANKSIDE, LONDON, S.E.

Any Engine, Pump, Hand or Steam Crane, Hoist, Winding Engine, Mortar Mill, or other Machinery in Stock may be had ON HIRE.

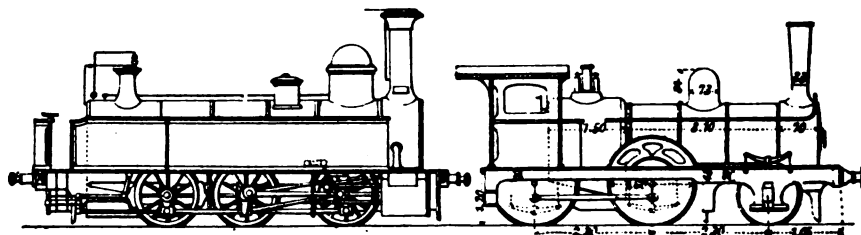


PRICE LIST
OF
ENGINES AND THEIR ACCESSORIES,
MACHINERY,
TOOLS, AND STORES,
FOR
MINING, QUARRYING, AND DRESSING OF ORES.

CHRISTOPHER SEARCH AND CO.,
ENGINEERS,
16, CRAVEN STREET, CHARING CROSS,
LONDON.

TANK LOCOMOTIVES,

FOR MINERAL LINES.



The following Prices of Tank Locomotives are for Engines of the best construction, both as regards design, workmanship, and materials, and they can be confidently recommended to the notice of Colliery Proprietors and others requiring Locomotives for use on short lines of rail.

No.	Diameter of Cylinder.	Length of Stroke.	Indicated H.P.	Number of Wheels.	Diameter of Wheels.	Gross Weight.	Draught.	Total Heat Surface.	Grate Area.	Length of Barrel.	Diameter of Barrel.	Tubes.	Capacity of Tank.	Price.
	inches.	inches.			inches.	tons.		feet.	feet.	inches.	inches.		gallons.	£
1	6	12	40	4	24	6	120	120	2½	64	27	50 × 1½	150	500
2	7	12	70	4	30	7½	160	162	3½	70	27	50 „ 1½	200	650
3	8½	15	100	4	30	10½	240	233	5	80	33	52 „ 2	250	790
4	10	15	140	4	36	12½	280	333	6	86½	36	80 „ 2	300	900
5	10	18	150	6	36	13	280	333	6	86	36	80 „ 2	300	1000
6	11	18	200	4	36	13	330	399	6½	87	36	90 „ 2	400	1000
7	11	20	200	6	36	15	330	399	6½	90	36	90 „ 1½	400	1200
8	12	20	280	4	42	16½	460	510	8½	100	39	100 „ 1½	500	1200
9	12	20	280	6	42	19	460	510	8½	101	39	105 „ 1½	500	1350
10	13	20	340	4	39	18½	540	561	9	100	39	110 „ 1½	600	1350
11	13	20	340	6	39	19½	540	561	9	102	39	110 „ 1½	600	1500
12	14	22	400	4	42	21	600	658	11	110	42	120 „ 2	700	1500
13	14	22	400	6	42	22½	600	658	11	105	42	125 „ 2	700	1750

When applying for Specifications of Locomotives, the following information is necessary in order to determine which will be the most suitable and economical Engine for the duty to be performed :

1. Gauge of railway.
2. Weight of rails a yard, distance apart of sleepers, and whether joints are fished or not.
3. Length of journey which the Engine is required to make without stoppage.
4. Length of radius of the sharpest curve.
5. Length and gradient of the steepest incline, and whether the Engine has to start on the incline or not. If any curves on the incline, the radius of sharpest to be given.
6. Greatest gross load in tons, including wagons or carriages, which the Engine is required to take at one time.

CHRISTOPHER SEARCH AND CO.,

ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

COAL AND MINERAL WAGONS.

Wagons used upon the main lines of Railway for the transit of coal, are not only subjected to heavy loads, but are exposed to constant and violent shocks in starting, stopping, and shunting. Hence they have to be constructed in the most solid manner, of the best materials, and the quality of the workmanship must be of the highest character. The following points should be attended to in drawing up Specifications for Coal Wagons:

The Framing should be of good sound Oak timber, strongly bolted together; the side and end Planking being of Red Deal, and the Flooring of Spruce; and all Joints should be well bedded in White-lead. The sides and end of the Wagon should be secured by Wrought-Iron Corner Plates, the full depth of the Wagon sides fastened with Bolts and Nuts. All Ironwork should be of the best material. The Wheels should be 3 feet in diameter, with eight Double Spokes, the Tyres of Patent solid Weldless Iron. The Axles should be forged from the best Scrap-Iron. The Bearing Springs should be of good Steel, and secured to the Axle Boxes with Spring Ties, or Bolts and Nuts. Each Wagon should be fitted with a strong Double Brake, and Wrought-Iron Diagonal Stays, to prevent the body of Wagon oscillating. The dimensions of Framing, Axles, Axle Boxes, Wheels, and Buffers must be in accordance with the regulations of the line of Railway on which the Wagons are intended to run. The whole of the woodwork should be well painted with three coats of good oil paint, the ironwork being picked out with black. They must also be properly lettered and numbered in accordance with the regulations of the Railway Companies.

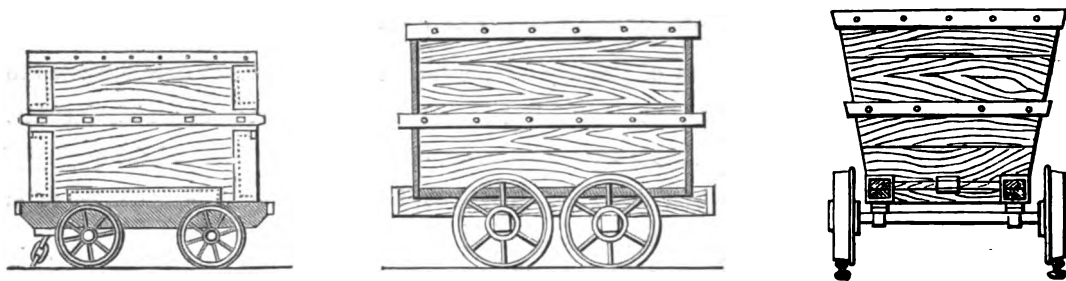
Coal Wagons are made with side and bottom doors, with side and end doors, or with side doors only. The fastenings to these doors are sometimes made self acting. They are seldom provided with spring buffers, though these would evidently greatly reduce the wear and tear, and, consequently, the cost of maintenance; they are, however, sometimes constructed with spring buffers at one end, and dead buffers at the other, which is a very efficient arrangement. They are constructed to carry 6, 8, and 10 tons, of 21 cwt. each, their inside dimensions being 14 ft. 6 in. $\times$ 7 ft. $\times$ 3 ft., and their average weight 5 tons.

The Prices for Wagon constructed as described above would be:

	6 tons.			8 tons.			10 tons.		
	£	s.	d.	£	s.	d.	£	s.	d.
For Cash	66	0	0	72	10	0	81	0	0
On 5 years' Purchase Lease	15	10	0	17	16	0	19	0	0
On 7 years' Purchase Lease	12	0	0	14	0	0	15	0	0

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

COLLIERY TUBS.



The Wagons used in the underground conveyance of coal, and known by the name of Tubs, require to be constructed as light as they can be, compatible with strength. The roads over which they run being generally rough and uneven, they are constantly liable to be thrown or run off the rails, and for this reason they require to be comparatively light, in order that the men may be able easily and without loss of time to replace them on the rails; they are also required to be light in order that they may be moved rapidly from place to place, and that there may be as little dead weight as possible to be raised and lowered by the engine in the cages. For this reason they are generally constructed of wood, the most suitable for the purpose being oak. The sides and bottom should be about 1 inch thick and firmly fastened together at the angles by iron plates. The roads through which the Tubs run are generally and necessarily low, and the Tubs therefore have to be kept low, which is done by making the wheels of small diameter; ranging in those in which the wheels are placed under the Tub from 8 to 12 inches, and in those in which they are outside the body from 15 to 18 inches. These small wheels of necessity greatly increase the friction on the rails, and to obviate this various kinds of bent or elbow axles have from time to time been introduced, which, by placing the centre above the bottom of the Tub, allow of wheels of much larger diameter being employed.

Coal Tubs are generally constructed to carry from 6 to 9 cwt. of coal, and weigh from 3 to 4 cwt. each, their height above the surface of rails being from 2 ft. 4 in. to 3 ft. 9 in., and their general breadth from 2 ft. 6 in. to 3 feet. Iron Tubs weigh from 1½ to 2 cwt. Larger Tubs, holding from 11 to 12 cwt. each, are sometimes employed, but their extra weight, and consequent extra wear and tear of rails, and loss of time in getting off the rails, together with the slower rate of conveyance both along the roads and in the shaft, add considerably to the cost of maintenance and working of the mine.

Wooden Tubs, £3 10s., £3 15s., and £4 each.

„ „ Manchester Tipplers, £8 each.

Iron Tram-Wagons and Skips, complete, 36s. per cwt.

Crucible Cast Steel Wheels, 36s. per cwt.

„ „ Pedestals, 46s. per cwt.

Bessemer Steel Axles, 25s. per cwt.

KIBBLES.

Whim Kibbles of Hammered Iron, 27s. 6d. per cwt.

„ „ Rolled Iron, 26s. per cwt.

Winze „ „ „ 15s. each.

„ „ Plates Hammered, 22s. 6d. per cwt.

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

DRAWING CAGES.

The Cages employed in drawing coal are constructed with one, two, or even three decks or platforms, each deck carrying one or more Tubs. They should be made as light as possible, consistent with strength, in order to reduce to a minimum the proportion of dead weight. In well-constructed Cages even this usually is about two to one in those carrying two Tubs, while in those carrying four Tubs it is about three to two. Drawing Cages should always be provided with a safety hook or attachment, which, by coming in contact with a part of the framework arranged for the purpose, may unship the Cage, and land it in safety on the pit's mouth, and so prevent the possibility of accident from over-winding. Where Cages are employed for raising and lowering the men in the mine, they should always be provided with some kind of safety attachment, by which their descent may be arrested in the event of the machinery or ropes breaking, as otherwise great loss of life may result from these accidents. Cages are always used in the pit with either guide ropes or some kind of iron or timber guide bars, and should therefore be provided with guide rings if to be used with the first arrangement, or with guide cheeks or rollers if with the second. Although the employment of Drawing Cages adds greatly to the dead weight to be raised and lowered in the pit, yet this is more than compensated for by the **extra** speed with which the Tubs are drawn from the mine, which by their use has been in some cases increased from 3 feet a second to 10, 13, and even 16 feet; and also by simplicity of operation, both of which tend of necessity to economy in working. The output has in many cases been more than doubled by their use, without any increase in the power employed. Generally the best Cages to employ will be found to be those which carry two Tubs on the deck, instead of those with two or more decks.

The Prices for Cages range from about £37 to £45 per ton.

Guide Ropes about 32s. per cwt.

COLLIERY RAILS.

The Rails used for the underground transit in Coal Mines are generally either Bridge or I Rails of light section, averaging, on the engine planes, from 18 to 28 lb. a yard, and being often in the minor roads as low as 10 or 12 lb. a yard. The Rails used at surface for the tramway connecting the pit mouth with the main line of railway average from 40 to 50 lb. a yard. Cast Iron or Plate Rails are sometimes used underground, but the extra cost of maintenance soon more than compensates the saving effected in first cost. The friction on Plate Rails is also much greater than on Salient Rails, the proportion being 12 to 7. Rails are made in lengths of 9, 12, and 15 feet.

Prices, Bridge or Flanged Rails, £9 to £11 per ton.

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

SEARCH AND CO'S VERTICAL WINDING AND HAULING ENGINES.

B No. 1.

These Engines have been specially designed to meet the convenience of Colliery Proprietors, Mining Engineers, and others, for Winding, Sinking, or Hauling. They consist of a pair of Cylinders working into a double or disc crank-shaft, on which is a pinion driving a spur wheel on the drum shaft. They are fitted with reversing gear, and are self contained on a strong cast-iron box bed plate; they require very little foundation, in fact, some are working bolted to a wood frame only. For underground hauling these Engines are well adapted, being easily taken to pieces to go down the shaft, and being self contained cannot get out of place, and only require fixing as an ordinary crab. They are intended to supersede the semi-portable Engine, their first cost being less than half, and as they are tested with steam, and proved well before leaving the Works, they may be depended upon for good working as soon as they are bolted down and steam applied.

These Engines are fitted with brakes and all necessary grease and oil cups; the connecting rods, eccentric rods, and link motion are all of the best forged scrap iron and case-hardened; the crank shaft and drum shaft are of the best forged scrap iron and fitted with massive gun-metal bearings. All joints are planed, and all parts are made to standard gauges, and fitted in the best possible manner.

Diameter of Cylinder.	Stroke.	Gearing.	Diameter of Drums.	Lagging.	Width of Drums.	Force Pump Extra.	Price.
inches. 10 12	inches. 12 12	inches. 5 to 1 5 " 1	feet. 5 5	Wood. "	feet. 6 6	£ 8 10	£ s. d. 215 0 0 260 0 0

APPROXIMATE WEIGHT, 5½ TONS.

SEARCH AND CO.'S VERTICAL WINDING AND HAULING ENGINES. B No. 2.

These Engines are the same as B No. 1, with *double* drums attached, fitted with double clutches and brakes.

Diameter of Cylinder.	Stroke.	Gearing.	Diameter of Drums.	Lagging.	Width of Drums.	Force Pump Extra.	Price.
inches. 10 12	inches. 12 12	inches. 5 to 1 5 " 1	ft. in. 4 6 4 6	Plate Iron. "	feet. 2 2	£ 8 10	£ s. d. 272 0 0 310 0 0

APPROXIMATE WEIGHT, 5¾ TONS.

SEARCH AND CO.'S DIAGONAL WINDING AND HAULING ENGINES. MARK B.

Diameter of Cylinder.	Stroke.	Gearing.	Number of Drums.	Diameter of Drums.	Lagging.	Width of Drums.	Force Pump Extra.	Price.
inches. 12 12 14 14	inches. 18 18 18 18	6 to 1 6 " 1 6 " 1 6 " 1	2 1 2 1	ft. in. 4 6 5 0 4 6 5 0	Plate Iron. Wood. Plate Iron. Wood.	feet. 2 5 2 5	£ 10 12 14 14	£ s. d. 385 0 0 335 0 0 440 0 0 397 0 0

SEARCH AND CO.'S IMPROVED HORIZONTAL WINDING ENGINES.

These Engines are made of the best material, and the workmanship is of the highest class; the link motion, connecting rods, and shafts are of the best scrap iron.

A speciality is made of a pair of Horizontal Engines with reversing gear and drum, 5 feet or 6 feet.

Diameter of Cylinders, 12 inch. Stroke, 24 inch. PRICE, £275.

PRICES OF OTHER SIZES ON APPLICATION.

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

IMPROVED BEAM PUMPING ENGINES,

FOR WATER AND SEWAGE WORKS, MINES, &c.

These Pumping Engines are of a greatly improved construction, and are particularly adapted for raising water from deep wells or mines to a considerable height. They are made of various sizes, to discharge from 100 gallons to 2000 gallons per minute, and to lift from 100 to 500 feet high. The material and workmanship are of the best description. The Beam is of wrought-iron plates, the Pump has gun-metal working barrel and valve seats. When required, these Engines are fitted with Compound Cylinders and Surface Condensers, for working with a small amount of fuel.

Prices quoted on receipt of the following particulars: 1st. Quantity of water required a minute. 2nd. Depth of well from the surface. 3rd. Height to which the water has to be raised above the surface.

PORTABLE COLLIERY FORCE PUMPS,

FOR HORSE OR STEAM POWER.

These Pumps are specially adapted for underground and narrow workings. They are portable, easily started, very powerful, strong, and durable; and have been supplied to numerous mines and collieries both at home and abroad, and are giving every satisfaction. When working, their vertical height above the water should not exceed 25 feet.

PRICES.

Treble Rams.	Size of Suction and Delivery Pipes.	Strokes a minute.	Vertical height raised by one horse.	Number of Gallons raised by one horse an hour.	Size of Horse Gear, Pump, and Frame, without Wheels.			Diameter of Horse Track required.	Mounted on Oak Frame, without Wheels.	
					Length.	Width.	Height.		Iron Rams.	Gun-Metal Rams.
inches.	inches.		feet.		feet.	ft. in.	feet.	feet.	£ s.	£ s.
3	2	30	135	1100	5	3 0	2	14	48 10	52 10
4	2½	30	75	..	7	3 4	3	18	54 0	60 0
5	2¾	30	50	..	7	3 4	3	18	57 0	64 10
6	3	30	35	4900	7	3 4	3	18	59 10	68 10

Pole, hook, and swingle tree for one horse, 30s. extra.

Two poles, brace, chains, and two swingle trees for two horses, or four bullocks, 70s. extra.

Gun-metal plungers are strongly recommended in preference to iron plungers.

Where wheels are necessary, the Mining Engineer fits them to suit his own requirements.

Extra small size Horse-Gear Colliery Engine, with 4-inch double action, instead of treble-barrel Pump, made specially for passing through very narrow workings in mines, complete with pole, hook, and swingle tree, and suction and delivery unions for 2-inch piping, £24.

HAYWARD TYLER AND CO.'S DIRECT-ACTING PUMPING ENGINES.

These Engines, being self contained, require but little foundation, and can be placed in the workings and readily moved forward as the heading advances. They are largely employed in coal pits, raising water to various heights, and are found to perform their work in a satisfactory manner.

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

HIGH-PRESSURE EXPANSIVE STEAM ENGINES.

FITTED WITH PATENT HIGH-SPEED GOVERNOR.

In these Engines the bed plate, front cylinder cover, cross-head guides, and plummer block for crank-shaft bearing are all cast in one piece, the cylinder with its valve chest being bolted to the end of the bed. The cross-head slippers and connecting-rod ends are made adjustable, so that any wear can be readily taken up. The fly wheel, cylinder end, connecting rod, and crank plate are all bright. All the parts are made to Whitworth's Gauges, so that duplicate parts can be at any time obtained by describing the part required and giving the number of the Engine.

PRICES AND PARTICULARS.

Number	A	B	C	D	E	G	H	J
Diameter of Cylinder	3 in.	4 in.	5 in.	6 in.	8 in.	9 in.	10 in.	12 in.
Length of Stroke	6 in.	8 in.	10 in.	12 in.	16 in.	18 in.	20 in.	24 in.
Revolutions a Minute	240	180	144	120	90	80	72	60
Indicated Horse-power. Speed of Piston 240 feet a Minute, 50 lb. pressure cut off at half-stroke	2.1	3.8	5.9	8.6	15.0	19.4	23.9	34.5
Price of Engine	£ 27 10 s.	£ 32 0 s.	£ 38 10 s.	£ 46 0 s.	£ 70 0 s.	£ 90 0 s.	£ 110 0 s.	£ 130 0 s.
„ Feed Pump	..	3 0	3 10	4 0	5 10	6 0	7 10	8 0
„ Steam-Jacketed Cylinders	..	..	..	3 0	4 0	4 0	5 0	5 0
„ Variable Expansion-Gear	..	..	..	10 0	12 0	13 0	14 0	15 0

Prices of Engines complete, with Feed Pump, and Cornish Boiler, and all Fittings, may be had on application.

The Robey Mining Engine, and Patent Improved Robey Mining Engine.

These Engines, which are constructed of from 20 to 200 effective horse-power, are specially recommended to Mining Engineers and others, as by their adoption great saving of time and expense of fitting is effected; but very slight foundations being required, and no brick chimneys. They are easy and economical in working. The Engine running at a high speed relatively to the load, there is much less risk of over-winding, the whole machinery is more thoroughly under control, and can be started, reversed, or stopped in any position with the greatest ease; and all the levers being conveniently near to the fire door, one man is enabled to attend to both stoking and driving. The locomotive type of boiler employed will evaporate about 20 per cent. more water per lb. of coal than the Cornish or egg-ended; while at the same time, as it works with an artificially strong draught, an inferior and therefore cheaper class of fuel can be used; the result of the whole being an economy of fuel, as proved by actual comparison with the old type of engine doing the same work, of from 10 to 50 per cent. These Engines are available not only for winding, but for pumping, sawing, &c., which is a great desideratum at a large colliery.

Prices, together with all other particulars required, may be had on application.

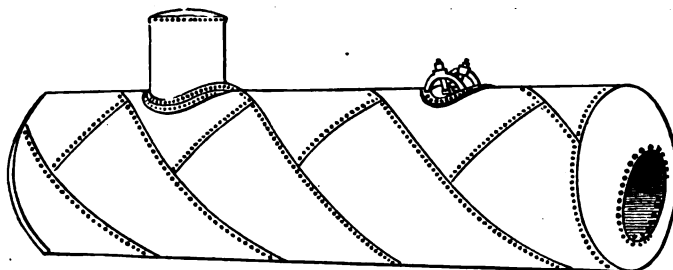
Prices, Specifications, and full particulars of any description of Winding, Pumping, Underground Hauling, Mill, Forge, or any other description of Engine, either single or coupled, high pressure or condensing, will be furnished on receipt of information as to the nature of the work to be performed and the power required; at the same time the following Price List of Horizontal High-Pressure Engines fitted with Wrought-Iron Slot Link Reversing Motion, Brake Gear, Drum Rings, &c., complete, will serve as a guide to estimate the probable cost:

Nominal H.P.	Bore.	Stroke.	Price.	
			A Pair.	Single.
		inches.	£	£
12	12	22	260	130
14	12½	24	310	155
16	14½	27	350	175
20	16	30	440	220
25	18	33	550	275
30	20	36	660	330
40	22	48	880	440
50	26	48	1100	550

Winding Indicators, £12 each.

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

STEAM BOILERS.



Made from the best Staffordshire Plates, furnished with steam domes, bearing flanges, man and hand hole plates. Boilers with one flue have the furnaces in the flues, and the Prices include fire doors and frames, grate and bearing bars. Boilers with six flues are arranged to have the furnaces outside. Boilers larger than 4 feet in diameter, with two flues, can be arranged with furnaces in the flues, or on the outside, at option.

CORNISH STEAM-BOILERS.

Of the best Staffordshire Plates, and tested to 150 lb. to the square inch. Fitted with furnace bars, doors, and door frames; hand and man hole plates and dead plate.

No.	H.P.	Length.	Diameter.	Diameter of Flue.	Diameter of Dome.	Height of Dome.	Price, with Fittings.
		feet.	inches.	inches.	inches.	inches.	£
1	3	9	36	20	16	22	45
2	4	10	39	21	18	24	52
3	6	12	44	24	20	26	75
4	8	14	48	26	22	28	101
5	10	16	51	28	23	30	110
6	12	17	54	29	24	32	120
7	14	19	56	31	26	33	147
8	16	21	58	32	27	35	170
9	20	24	61	34	28	36	208
10	25	29	64	35	29	39	267
11	30	33	66	36	30	40	304

VERTICAL TUBULAR BOILERS.

The iron in these Boilers is best Staffordshire Plate; the fire boxes of Lowmoor Plate. The tubes are fitted with Patent Expanding Ferrules, and the Boilers tested to 150 lb. to the square inch.

Fittings comprise fire door and frame, bearing and grate bars, stand, smoke box, man and hand hole plates, and crab bars. Mountings comprise steam and water gauges, steam cock and spanner, feed cock and spanner, and safety valve.

No.	H.P.	Height.	Diameter.	No. of Tubes.	Diameter of Tubes.	Price.			
						With Fittings.		With Mountings.	
		ft. in.	inches.		inches.	£	s.	£	s.
1	1½	3 8	20	6	2½	16	10	20	0
2	2	4 8	24	7	2½	20	10	25	6
3	2½	4 8	28	8	2½	25	6	29	14
4	3	5 0	32	10	2½	29	14	35	4
5	4	6 0	35	12	2½	41	16	47	6
6	5	7 0	36	14	2½	49	10	55	2
7	6	8 0	38	16	2½	57	4	64	18
8	8	9 0	42	20	2½	68	4	77	0
9	10	10 0	48	24	2½	85	16	95	14

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

GALLOWAY'S PATENT CONICAL WATER TUBES FOR STEAM BOILERS.

These Tubes are adapted for introduction into any existing Cornish or other Boilers, as the amount of taper in their form is sufficient to allow the bottom flange to pass through the hole in the upper side of the Boiler flue, and the operation of fixing is very simple. The advantages derived from their use are to greatly increase the power of the Boiler, to strengthen the flues, and promote a thorough circulation of water. Their use is becoming very general, and any Boiler Maker can apply them. When ordering these Tubes, it is necessary to give exact dimensions of the internal diameter of flue, and thickness of plates, or the length of tube from inside of one flange to outside of the other flange.

PRICES AT WORKS, INCLUDING ALL CHARGES FOR ROYALTY.

Not exceeding 3 ft. 0 in. in length	.. .. .	55s. each.
„ 3 „ 6 „ „	.. .. .	60s. „
„ 4 „ 0 „ „	.. .. .	65s. „

SUSPENDED WEIGHING MACHINES.

These Machines are used for weighing Minerals and Stores during their removal from ships, canal boats, railway wagons, and the like, by affixing to the crane, thereby converting the crane into a weighing crane, and saving a great amount of time and labour in weighing the goods whilst being lifted. They are small, portable, and easily applied. A kibble or skip can be tared off whilst on the slings or lifting hooks. The smaller sizes are marked in 1 lb. divisions, the larger in 4 or 7 lb. divisions. They commence indicating with the first hundred-weight, and can be made to suit any weights.

PRICES.

No.	Power.	Price.			No.	Power.	Price.		
	cwt.	£	s.	d.		tons.	£	s.	d.
1	20	8	10	0	7	4	21	0	0
2	25	9	12	0	8	5	24	10	0
3	30	10	16	0	9	10	29	0	0
4	40	13	4	0	10	20	44	0	0
5	50	15	12	0	11	30	50	0	0
6	60	17	10	0	12	40	56	10	0

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

PIT-BANK WEIGHING MACHINES.

The requirements in these Machines are simplicity of construction, and accuracy, speed, and convenience in registering the weight; accuracy being, under the Mines Regulation Act, 1872, of the first importance. These advantages are all to be found in J. W. Stead's Patent Double Steelyard Pit-Bank Weighing Machines; in Messrs. Spencer and Co.'s Patent Dead Weight Pit-Bank Weighing Machines; and in Hodgson and Needham's Patent Triple Steelyard Pit-Bank or Colliery Weighing Machines.

J. W. STEAD'S WEIGHING MACHINES.

These Machines are made to any dimensions and power, and with or without Turn-table or rails, as may be desired. There are no springs or any other objectionable feature; and as all the parts are constructed of the best materials, and with a knowledge of the rough usage to which Pit-Bank Machines are subjected, it is all but impossible for them to get out of order.

THE PRICES OF THESE MACHINES ARE AS FOLLOWS:

Power.	Dimensions of Platform.	Price.	Turn-tables extra.	
cwt.		£	£	£
20	3 ft. 0 in. by 3 ft. 0 in. to 4 ft. 0 in. by 4 ft. 0 in.	18 to 25	3 ft. 0 in.	4
30	3 " 6 " 3 " 0 " 4 " 4 " 3 " 9 "	23 " 29	3 " 6 "	5
40	4 " 0 " 4 " 0 " 5 " 0 " 3 " 6 "	31 " 33	3 " 6 "	6
50	4 " 0 " 4 " 0 " 5 " 0 " 3 " 6 "	35 " 37	3 " 6 "	6

SPENCER'S WEIGHING MACHINES.

In SPENCER AND CO'S Machines the two Steelyards are placed one over the other; the bottom one is divided to cwt.s. for the minimum weight of load, the top one being made duplicate, one portion to tare by, the other marked to 2 cwt., on which all the weighing will be done. In these Machines the parts most liable to get out of order are constructed of such strength and rigidity that they will not be so subject to disarrangement, and being made without springs or wheels, will not be liable to vary at different temperatures. The Steelyards are marked on each side, so that the weigh and check clerk can see the weight at the same time. They are supplied either with or without Turn-table.

The prices of these Machines are, for a gross power of 25 cwt.:

3 ft. 0 in. Turn-table Platform, £23. 3 ft. 6 in. Turn-table Platform, £25.

HODGSON AND NEEDHAM'S WEIGHING MACHINES.

Messrs. HODGSON AND NEEDHAM'S Patent Triple Steelyard Weighing Machines, of which large numbers are now in use, cannot be surpassed either for quickness in weighing, accuracy, or durability.

These Machines are made with or without Turn-table, and to any length in neck, to suit any position, and are all fitted with Patent Steelyards, having raised brass figures.

Power.	Size of Platform.	Price.	Turn-table extra.
cwt.		£	£
10	3 ft. 6 in. by 2 ft. 6 in.	£11 10	} £5 to £6 10
15	3 " 6 " 2 " 6 "	£14 0	
20	3 ft. 0 in. by 3 " 0 in. and 3 " 3 " by 3 ft. 3 in.	£16 and £16 10	
25	3 " 6 " 3 " 0 " 3 " 3 " 3 " 3 "	£18 0	
30	4 " 0 in. by 4 " 0 "	£21 10	
40	5 " 0 " 4 " 0 "	£27 0	

HODGSON AND STEAD'S PATENT SELF-INDICATING WEIGHING MACHINE, CAPABLE OF WEIGHING TWELVE TRUCKS A MINUTE.

PRICE.

20 cwt. .. 3 ft. 0 in. by 3 ft. 0 in., and 3 ft. 3 in. by 3 ft. 3 in. .. £27 and £29.

POOLEY'S PATENT SELF-INDICATING PIT-BANK WEIGHING MACHINE, WITH OR WITHOUT TURN-TABLE.

PRICE.

With Turn-table, 20 cwt. .. £51 to £59. Without Turn-table, 15 cwt. and 20 cwt. .. £31 to £40.

Drawings and Specifications of Surface Works on application.

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

2 R 2

BLOWING FANS.

FOR FOUNDRIES, VENTILATING, BLACKSMITHS' FIRES, &c.

These Fans are noiseless and create no annoyance, so that they can be fixed within a workshop or foundry wherever it is most convenient, and are of the best design and workmanship.

PLAIN BLAST FANS.

No.	Diameter of Fan Case.	Diameter of Discharge Pipe.	Number of Smiths' Fires supplied.	Tons of Iron melted in one Hour.	Diameter of Driving Pulleys.	Price of Counter-shaft.	Price of Fans.
	inches.	inches.			inches.		£ s. d.
1	14	3	1	..	3	To Estimate.	3 12 0
2	21	4½	3	..	4½		5 8 0
3	27	6	7	1½	6		7 4 0
4	36	8	10	1¾	8		12 0 0
5	42	10	14	2½	10		14 8 0
6	61	14	30	5	14		25 0 0
7	77	18	70	10	18		43 15 0
8	96	24	160	20	24		68 15 0

COMPOUND EXHAUST FANS, WITH DOUBLE INLETS.

For Ventilating by induction, or can be employed for ordinary purposes, the same as the Fans in the first List.

No.	Diameter of Discharge Pipe.	Cubic Feet of Air discharged each Minute.	Number of Revolutions a Minute.	Price of Counter-shaft.	Price of Fans.
	inches.				£ s. d.
1	4½	600	Instructions sent with Fans.	From £5 to £6 for each inch of diameter.	7 4 0
2	6	1000			9 12 0
3	8	2500			15 12 0
4	10	4000			20 8 0
5	14	8000			32 10 0
6	18	14000			58 15 0
7	24	28000			90 0 0

ROOTS' PATENT ROTARY BLOWER.

The advantages possessed by the Blowers over the ordinary Fan are:—1. They give a force blast, and thus give a regularity and reliability of blast never given by a Fan. 2. They effect a saving of at least half the power by performing more effectively, at a speed of 200 to 400 revolutions a minute, the work which would require with a Fan a speed of from 2000 to 4000 revolutions a minute. This comparatively slow motion greatly increases its durability, there being much less wear and tear of belting, and the running parts of the machine. 3. A material saving of coke by producing a more perfect combustion, while at the same time an inferior quality of coke can be used with a Blower than with a Fan. These Blowers are largely employed both in this country and in America, upwards of 900 being in use at the present time. The conducting pipes should be of iron and perfectly tight, as no dependence can be placed either on tile piping or underground brick flues. In ordering Blowers, it should be stated whether the delivery outlet is to be fixed at the bottom or top of the machine. Air-tight pipes, with shut-off valves, are necessary between the Blower and the Cupola, or smiths' fires, and should be fitted with an escape valve; the extra charge for this ranges from 15s. to 80s., according to the size of Blower and number of fires.

PRICES.

No.	Revolutions a Minute.	Cubic Feet of Air a Minute.	Weight.	Power required.	Price.
			cwt.	Horse-power.	£ s. d.
1A	350	800	6	½	27 0 0
1	400	1300	8½	1	30 0 0
2	400	2000	10	2	40 0 0
3	380	3000	14	4	55 0 0
4	350	4550	24	6	75 0 0
5	320	6400	27½	8	95 0 0
6	310	8680	49	11	120 0 0
7	300	10800	53½	14	150 0 0

These Blowers are also supplied, arranged to be driven with Vertical Engines, all on one bed plate, and occupying small space.

Special Blowers for ventilating mines, exhausting 50,000, 100,000, or 200,000 cubic feet of air a minute, with or without Engines, fitted up complete.

Prices of these and all other special Blowers, together with full particulars, can be had on application.

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

BELLOWS.

	30 in.	32 in.	34 in.	36 in.	
Ordinary	6os.	72s.	9os.	115s. each.	
	26 in.	28 in.	30 in.	32 in.	34 in.
Circular, with Iron Frame	13os.	152s.	177s. 6d.	20os.	235s.
					265s. each.

ROOTS' PATENT PORTABLE FORGES.

These Portable Forges are believed to be superior to any others in use; they are compact, durable, and efficient. The blast is produced by a small Roots' Patent Blower. In estimating the value of these Forges, and comparing the Prices with those of the ordinary kind with bellows, it must be remembered that the Patent Forge with the Blower is not only stronger, but is, size for size, more effective, and heats in much less time than a bellows forge.

PRICES.

No.	Size of Hearth.	Weight.	Price.	REMARKS.
1.	21 in. × 15 in.	1½ cwt.	£9 10s.	Suitable for small rivet heating.
2.	20 " 14 "	2½ "	£11 10s.	Ordinary rivet-heating fire.
3.	30 " 21 "	3½ "	£15 10s.	Rivet heating or small Smith work, and mending tools.
4.	40 " 26 "	5½ "	£21 10s.	Ordinary Blacksmiths' work.

Nos. 3 and 4 can be fitted with travelling wheels and handle at an extra charge of 15s. each. No. 2 is always mounted on wheels. No. 1 does not require wheels.

Ordinary Portable Forges from £4 each, according to size.

" " " on Wheels, from £5 each, according to size.

COAL-BREAKING MACHINERY.

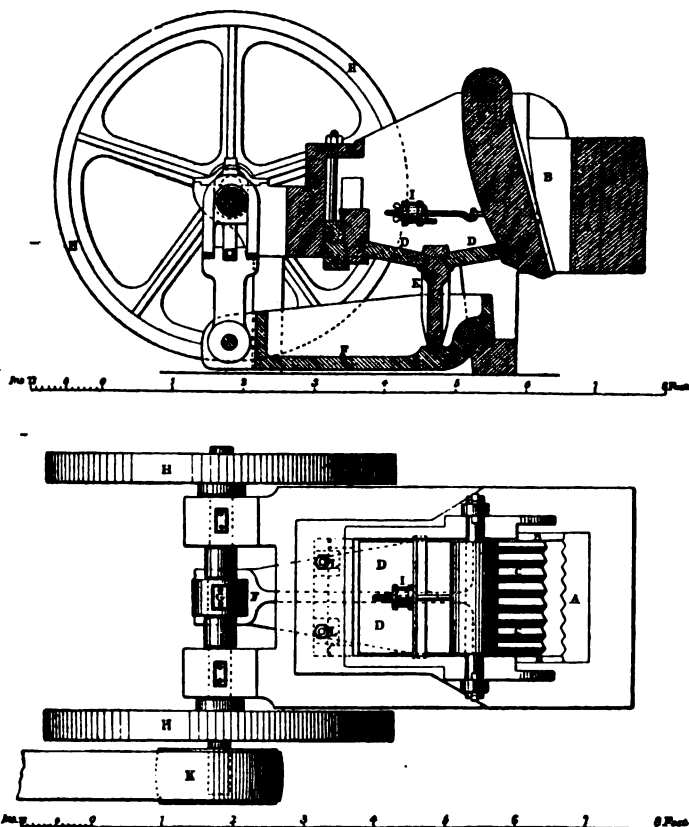
Wherever it is desired to obtain a sample of coal of even size, whether for making gas or feeding furnaces by automatic or other apparatus, Blake's Patent Coal Crushers will be found to be the most suitable and economical Machines. They are largely employed in Gas and other Works for breaking Cannel and other Coals, and also for breaking Fire Clays, Shale-Oil Coal, and Coal for Coking purposes, Phosphates and Nitrate Soda for Artificial Manure Works, Chalks and Gypsum for Plaster Works; and also by Colour Manufacturers.

PRICES.

Size.	H.P. required.	Weight.	Price.
12 in. by 5 in.	3	2 tons 5 cwt.	£75
12 " 7 "	4	2 " 10 "	80
24 " 12 "	7	4 " 15 "	200
24 " 16 "	8	5 " 5 "	230

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

ORE-CRUSHING MACHINERY.



For crushing all kinds of ore for the stamps or blast furnace, Blake's Machine appears to stand unrivalled, both on account of its power, simplicity of construction, and quality of work performed. Referring to the figures, it will be seen that the fixed jaw A, against which the stone is crushed, is a vertical fluted block of cast iron, bedded in zinc, in the end of the very strong cast-iron frame of the Machine, and held in its place by loose tapered cheek-pieces B, B, which fit into recesses on each side of the hopper. The movable jaw C is fluted on the breaking face to correspond with the fixed jaw, the ridges of the movable jaw being opposite the grooves of the fixed jaw; and the movable jaw is suspended from a large transverse pin above the frame. At the back of the movable jaw, to give the motion, are two struts D, D, in the form of flat cast-iron plates, extending the whole width of the jaw, and bearing in the middle the upright thrust-bar E; this bears at the bottom upon the main lever F, the whole forming a toggle joint of simple construction and great strength. When employed for ore crushing these Machines are often fitted with a Revolving Picking Table, by means of which appliance one hundred tons of ore, such as tough Elvin Rock, can be crushed and sepa-

rated in a day of ten hours; and when worked in combination with the stamps, a clear saving of £25 per cent. is effected. The jaws of each Machine can readily be adjusted to give the product any size required, from $2\frac{1}{2}$ inches to fine gravel.

A special Wrought-Iron Machine is made for exportation, which possesses the advantages of lightness combined with strength, perfect security from breakage, great rigidity, and easy transhipment. It is constructed of strong faggots of Wrought Iron, dovetailed together, all the parts being planed to fit accurately; tie bolts are then inserted, which hold the whole together, but are relieved of any strain due to the working of the Machine. The sides and ends are of Boiler Plate. Each piece weighs under 3 cwt., and is made for transit on mules' backs in mountainous districts, where no other mode of carriage is available. They are the only Machines which have been found to answer the purpose; they are very simple, strong, and durable, the working expenses are light, and the wear and tear 30 per cent. less than any other machinery exported for a similar purpose. They are made in two sizes, 10 in. by 7 in., and 15 in. by 9 in., but may be had made in other sizes if required.

There are at the present time upwards of 950 of all kinds of these Machines at work in all parts of the world.

PRICE.

The Prices of these Machines range, according to size and power, from £75 to £375; or, with Screen, from £80 to £390. Revolving Picking Table, £12 extra.

Wrought-Iron Machine for export, 10 in. by 7 in., £167. 15 in. by 9 in., £225.

Hand-power Machines, complete with driving frame, £15 to £75. Fitted with Screen, £5 extra.

These Machines are also made combined with Steam Engine. Prices and particulars of these, and all other information, can be obtained on application.

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

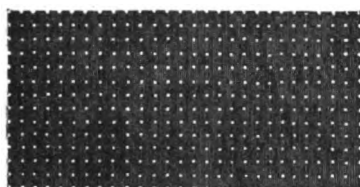
ARCHER'S PATENT ORE-CRUSHER.

This Machine, which is very similar to Blake's, is one of the most simple and cheapest of its kind. It is constructed in such a manner as to combine great effective power with the least amount of friction, and is adapted for being worked either by manual labour or steam power. The cam on the main shaft having two rises, each revolution of the shaft raises the end of the lever twice, and gives two thrusts to the jaw.

Size of Machine at mouth.	Quantity broken a Day.	Power required.	Price.	Travelling Wheels and Horse Frame, if required.	If with Elevators attached, extra.
inches.	tons.	H.P.	£	£	£
30 by 12	130	10	245		
18 " 12	80 to 100	8	195		
18 " 9	60	6	180	30	45
15 " 7	50	5	145	25	40
10 " 5	30	3	85	20	30
		Men.			
10 " 5	10	4	75	20	
8 " 4	7	2 to 4	60	15	
6 " 3½	5	2	35	10	

STAMPS IRONWORK.

CAST-IRON STAMPS AXLES, ordinary pattern	15s. 0d. per cwt.
" " with centre ends, turned and fitted	16s. 6d. "
CENTRE ENDS only, turned and faced	18s. 6d. "
STAMPS HEADS, without shank and ground	8s. 0d. "
" " with short shanks of faggotted iron	10s. 0d. "
" " with long shanks	12s. 0d. "
WROUGHT-IRON STAMPS TONGUES, steeled complete	8½d. per lb.
" " not steeled	7d. "
CAST-IRON STAMPS CAMS	10s. 0d. per cwt.



STAMPS GRATE PLATES	11s. 6d. per cwt.
" GUIDES AND BRACES	11s. 6d. "
" BUSHINGS AND BRANDICES	13s. 6d. "

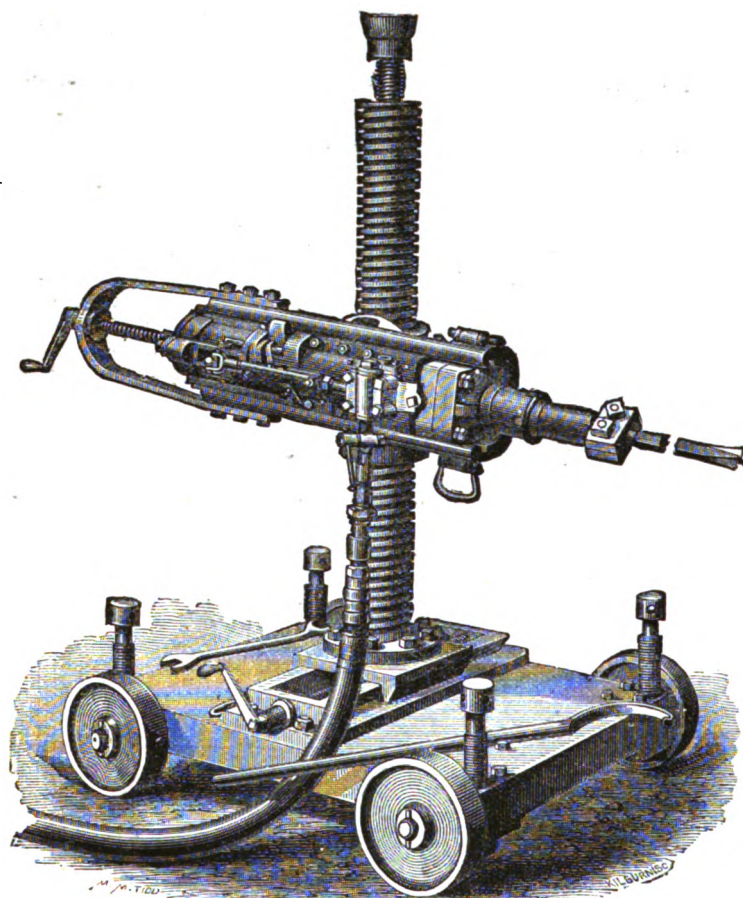
CRUSHER AND DRESSING IRONWORK.

CRUSHER ROLLS, cast in sand	12s. 6d. per cwt.
" " cast in chills	16s. 6d. "
PLAIN CASTINGS FOR BUDDLES	14s. to 20s. per cwt.
LIGHT " " "	according to pattern.

Drawings, Specifications, and particulars of complete Stamp Batteries, Buddles, Crushing Rolls, Separators, Trunking Machines either for Hand or Power, Brunton's Calciners, Washing Trunks, Griddles and Sieves, Jiggers, Brunton's Cloths, Hotching Machines, Ore Washers, Ore Calciners, Percussion Tables, and the like, of the most modern and approved construction, furnished upon application.

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

THE "BURLEIGH" ROCK DRILL.



This Machine, of which there are at the present time upwards of 650 in use, is applicable to every form of rock work. It is strong, light, compact, and easily handled. The principal parts of the Machine are the Cylinder with its Piston, and the Cradle with guide ways in which the Cylinder travels. The action of the piston is similar to that of the ordinary steam hammer, with this difference, that in addition to the reciprocating, it has also a rotary motion. The drill point is held in a slip socket, or clamp, at the end of the piston rod, by means of bolts and nuts. The drill point rotates regularly at each stroke of the piston, making a complete revolution in every eighteen strokes. By the use of the universal clamp, which can be attached to any form of tripod, carriage, or frame, the Machine may be worked in any required

direction, either vertically, horizontally, or at any angle. This Machine may be driven either by steam or compressed air, the latter being preferable for all mining and tunnelling operations.

PRICES.

- | | |
|--|-----|
| A. New Size for mining purposes, will drill holes from 1 inch to 2 inches diameter | £95 |
| B. "Jumper," for mining purposes, will drill holes up to 3 inches diameter | 120 |
| C. "Medium," for mines, quarries, or contractors, will drill holes up to 4 inches diameter | 135 |
| D. "Tunnel," for tunnelling and quarrying, will drill holes up to 5 inches diameter and 20 feet deep | 150 |

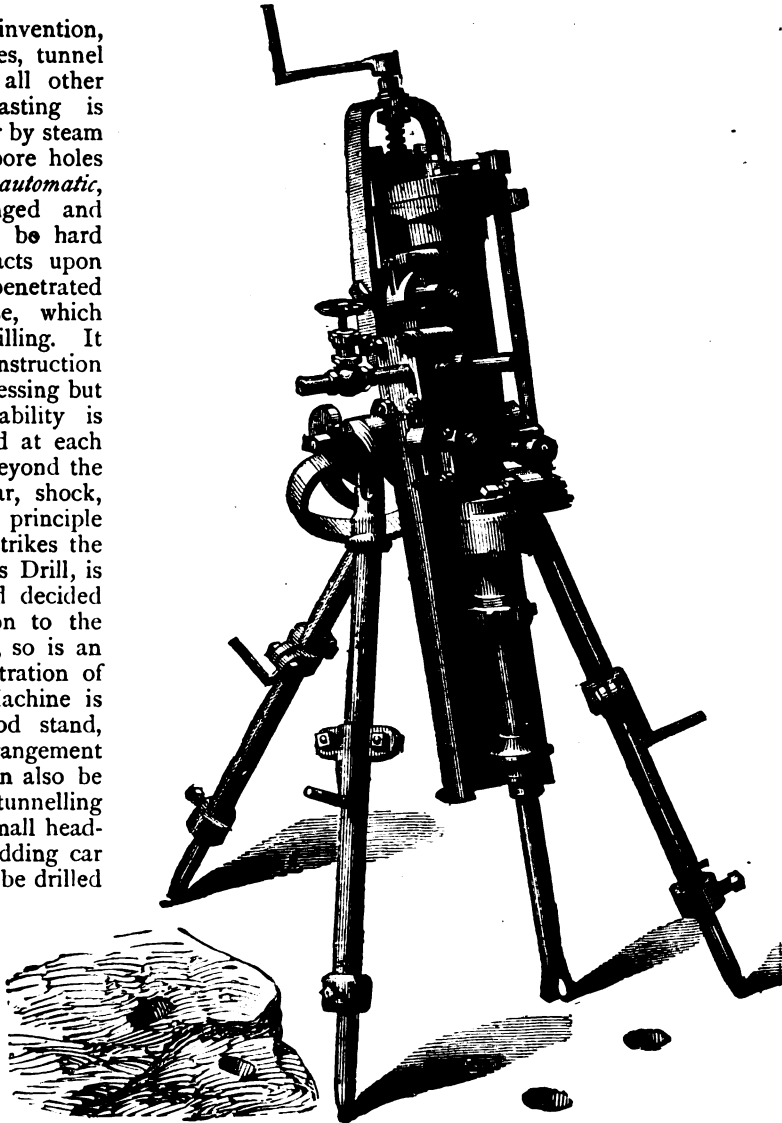
These Prices are for the Drills complete, with Tripod, Universal Clamp, and all Royalties.

Practical Instructions as to the use of Machine Drills in either Quarries, Headings, or Shafts furnished on application.

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

THE INGERSOLL ROCK DRILL.

This Drill, which is of late invention, is intended for use in mines, tunnel work, shafts, sewerage, and all other rock excavation where blasting is necessary. It is driven either by steam or compressed air, and will bore holes at any angle. The feed is *automatic*, and is so carefully arranged and balanced, that, let the rock be hard or soft, the piston never acts upon the feed until the rock is penetrated sufficiently for this purpose, which results in steady and rapid drilling. It is very simple, both in its construction and mode of operation; possessing but few moving parts, its durability is assured, and being cushioned at each end inside the cylinder and beyond the regular piston stroke, all jar, shock, and injury is avoided. The principle of forcing the piston until it strikes the rock, which is adopted in this Drill, is another feature of great and decided importance, for in proportion to the pressure of steam or air used, so is an increased speed in the penetration of the rock attained. This Machine is usually mounted on a tripod stand, which is the most suitable arrangement for vertical drilling, but it can also be had mounted either on a tunnelling column for use in shafts or small headings, on a newly-designed gadding car by the use of which holes can be drilled either vertically or horizontally, and stone taken out to any dimensions, or on various sized cars, according to the number of drills required for use in railways and other large tunnels.



PRICES.

Weight of Cylinder and Tripod complete.	Diameter of Cylinder.	Stroke of Piston.	To bore holes.		Price of Cylinder and Tripod complete.
			Diameter.	Depth.	
lb.	inches.	inches.	inches.	feet.	£
818	5	5½ and 8	1½ to 5	40	170
717	4	7	1½ „ 3	20	145
415	3½	5 and 7	1½ „ 2	15	120
173	2½	3½	¾ „ 1½	10	95

Prices of Cylinder or Tripod separately, and of all other kinds of supports and cars for use in tunnels and other works, together with any further information required, may be obtained on application.

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

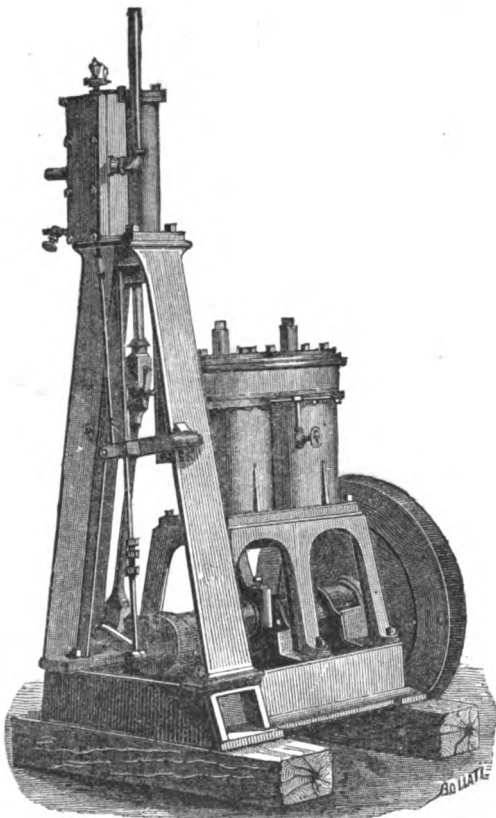
THE WARSOP AIR-COMPRESSOR.

This Machine consists of a Steam Engine and Air Compressor combined, working on one crank shaft, with cranks set at right angles, so that the steam exerts the greatest force where the air offers the greatest resistance; this secures uniformity of movement and the best results. Every attention has been given to the design and proportion of this Machine to ensure durability, simplicity, and strength, and the whole is carried on one bed plate so as to render fixing as easy as possible. Water is drawn into the cylinder in the form of spray at each stroke, which absorbs the heat of the compressed air, greatly assists in reducing its bulk, and lubricates the cylinder. By uncoupling the Compressor the Engine may be used for any ordinary purpose requiring steam power; a matter of importance in outlying districts. Special means are also adopted for preventing the *formation of Ice* in the machines driven by this Compressor.

PARTICULARS AND PRICES.

No.	Diameter of Steam Cylinder.	Diameter of Double-Acting Air Compressor.	Length of Stroke of Cylinder and Pump.	Revolutions a Minute.	Approximate Weight in cwt.	Cubic Feet of Air delivered at atmospheric pressure a Minute.	Cubic Feet of Air delivered at 35 lb. pressure a Minute.	Price.
	inches.	inches.	inches.					£
1	7	7	12	120	19	63	16	85
2	8½	8½	14	100	37	102	28	125
3	12	12	16	90	54	190	47½	210
3A	Two 12	Two 13	16	90	75	428	107	350
4	15	15	20	75	80	290	72½	295
5	20	20	36	40	120	523	130	465
6	26	26	36	40	200	883	220	765
6A	Two 26	Two 28	36	40	..	4048	1012	1400
7	30	32	48	30	..	1340	335	1020

THE "BURLEIGH" AIR-COMPRESSOR



Consists of a Steam Engine and two Single-Acting Air Pumps worked by a three-throw crank. The connecting rods are attached to the inside of each air piston—which is made in the trunk form—to which a valve is so fitted that at the descent of the piston it opens and at the ascent closes. The air chambers are also fitted with two valves, one directly over each piston, each of which opens at the ascent of its piston and closes on its descent, similar to the action of an ordinary pump. At each downward stroke of the pistons a small jet of water is made to play in the air chambers, which cools the air and lubricates the pistons; or, for the former result, the valve chest may be encased in a water jacket. The angles of the crank shaft are so set that when the greatest power is developed in the steam cylinder, the point of the greatest compression is being reached in the air cylinders alternately. Besides steam, any other available driving power, however, may be applied. The crank shaft may be driven from a pulley or by gearing driven from a water wheel, turbine, or portable engine. The compressed air is forced from the upper chambers of the air cylinders into a capacious receiver, whence a uniform pressure is maintained.

PARTICULARS AND PRICES.

No.	Steam Cylinders.	Air Cylinders, each.	Size of Base.	Extreme Height.	
	inches.	inches.	inches.	feet.	inches.
1	8 diameter 12 stroke	10½ diameter 18 stroke	56 × 43	7	0
2	9½ diameter 18 stroke	12 diameter 15 stroke			
			61 " 49	8	10
No.	Air compressed a Minute at 90 Revolutions.	Size of Discharge Pipe.	Price. With Engine.	Price Without Engine.	
	cubic feet.	inches.	£	£	
1	90	2½	180	125	
2	176	4	275	210	

IMPROVED AIR RECEIVER, FITTED WITH PRESSURE GAUGE AND BLOW-OFF TAP, PRICE £35.

FORCE PUMPS, FOR FEEDING BOILERS, FITTED ON COMPRESSORS, PRICE £10 TO £20.

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

COAL-CUTTING MACHINES.

The introduction of mechanical contrivances into Collieries to assist in getting Coal has of late been so much discussed, and the advantages to be derived therefrom so generally admitted, that the question is now reduced mainly to one, of which Machine will best answer the special requirements of the Coal proprietor, and at the least cost do the largest amount of work.

The Machines described below have been long in practical operation, under a variety of circumstances, and we are, therefore, enabled with every confidence to recommend them. They are designed for holing or undercutting, and are more especially adapted for collieries worked on the "Long Wall," or some similar system, where a considerable length of face can be operated upon.

"THE ECONOMIC" COAL-CUTTER.

This Machine is a very simple, light, cheap, and most efficient coal cutter; and is driven by compressed air, at the low pressure of 25 to 30 lb. a square inch, varying with the hardness of the mineral to be cut. The Machine requires no fixing, it can be made to suit any gauge, and will travel round the usual curves. It will cut close down to the rails, and when of the ordinary size—7 ft. 6 in. long, 2 ft. 4 in. wide, 2 feet high, and weighing about 15 cwt.—will undercut the coal to a depth of 3 feet, the width of the groove being 3 inches. The undercut may, if necessary, be at an angle from the horizontal. A stronger Machine can be made to undercut to a depth of 5 feet. The cutters require no fastening in the bar, being self fixing; when inserted they are comparatively costless, and can be made or sharpened by any colliery smith.

PRICE.

To undercut 3 feet £144

GILLOT AND COPLEY'S PATENT ROTARY COAL-CUTTER.

This Machine is made principally of steel and wrought iron, thus combining the greatest strength in the smallest space with the least weight. The frame is of angle iron, about 5 ft. 4 in. long by 2 ft. 4 in. wide, and on this are fixed two cylinders $7\frac{1}{2}$ in. diameter, with a 9 in. stroke, working on to a crank shaft, which by a very simple arrangement drives the pinion which gears into the slots of the cutter wheel. This wheel, which is of cast steel, is carried by a bracket projecting horizontally from the side of the Machine, it makes about six revolutions a minute, and on its outer edge are fixed twenty steel picks or cutters, thus giving 120 strokes a minute; it is 3 ft 10 in. diameter, and makes a clean cut of 3 ft. 4 in. deep by $2\frac{1}{2}$ in. to 3 in. thick, and from this space it entirely sweeps out the whole of the coal as it revolves. The cutter wheel is easily removed by slacking four bolts, and then the Machine can be run off to any other part of the workings where it may be required. The picks, which are made of tool steel, are as easily sharpened as an ordinary pick point, and are about 4 inches long by three-quarters of an inch square. It can be made to cut level with the floor, in a parting between two coals 3 feet or more above the trams, or at any other level, and is applicable for any seam of coal where a height of not less than 20 inches can be afforded for it to travel along the coal face. It will cut in fire-clay seating, *hard or soft coal*, or take out a pricking between two coals. It is driven by compressed air, and works at the low pressure of from 20 to 30 lb. per square inch. A fair average rate of work with 27 lb. pressure may be stated at 30 yards an hour, 3 ft. 4 in. under and 3 feet thick, either in a seating or moderately hard coal; the rate of holing by manual labour, in the fire-clay seating above named, is about 7 yards for a day's work; this gives about nine men working a whole day to do what the Machine does better in two hours. The men have only to wedge or shoot the coal down and clear it away whilst the Machine is taken to another bank to do its work there. The Machine is covered with a movable sheet-iron casing to protect it from anything falling from the roof. One man only is required to be in attendance on the Machine, and another should follow to sprag the coal as it is cut.

PRICE £200

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

2 S 2

"GLEDHILL'S PATENT IMPROVED COAL-CUTTING MACHINE."

The cutting in these Machines is done by an endless chain with cutters attached, driven round a jib or arm which projects underneath the coal from 2 ft. 9 in. up to 4 feet, as required. By reversing the motion and cutting tools, the Machine travels and cuts in either direction, and the gearing can be altered to speed required by the nature of the coal or other material cut. The undercut of this Machine being only $2\frac{3}{4}$ inches high, the dross or small coal produced is reduced to a minimum. The Machine also increases two to three fold the quantity of coal that can be taken by manual undercutting from a given face in a given time, and so lessens the up-keep of roads, and the area of supervision and ventilation, &c. The principal saving, however, is in the cost of undercutting. At work it is attended by three men—one driving, one lifting roadway behind Machine, and the other laying roadway in front, &c. The cutters are sharpened each shift, the cutting chain being brought to bank daily for this purpose, the cutters removed, sharpened, dressed to a gauge, and again fixed to chain. The Machine is actuated by air compressed on pit bank to 35 or 40 lb. on the square inch, and conveyed therefrom in cast-iron pipes. The present work done is 420 feet, cut 2 ft. 9 in. deep, in a shift of seven to eight hours, and as the seam worked is 2 ft. 10 in. thick, this yields 75 to 90 tons.

These Machines are of two sizes: No. 1., 2 ft. 4 in. high, requires about 3 feet of head room between pavement and roof. No. 2. is 1 ft. 8 in. high, including roadway, and so is capable of working the thinnest seam.

PRICE.

Free on Rail in England	..	..	..	..	..	..	..	..	£
									210
Packed for Export	..	..	..	..	..	..	..	..	240

WINSTANLEY & BARKER'S PATENT COAL-CUTTING MACHINE.

This Machine is driven by compressed air, the pressure required being from 20 to 30 lb. on the square inch, according to the nature of the coal or mineral to be cut. This Machine stands only 22 inches high, and being very simple in construction is not at all liable to get out of repair; the gauge of the wheels can be made to suit any ordinary colliery tramway. The cutter holes its own way into the coal, cutting, in fact, from nothing up to 3 feet or more in depth, the thickness of the groove being 3 inches, while the quantity of small coal made represents only from 25 to 35 per cent. of that produced by hand holing. The average rate of holing in hard coal, with a pressure of 30 lb. on the square inch, is 25 yards an hour, including stoppages, and this may be considered to equal the work which would be done by at least *thirty men* in the same time. This Machine has been in *successful operation for three years and a half*, without alteration, in a seam of coal 2 ft. 4 in. in thickness.

PRICE.

Including two sets of cutters, a small crab or winch, and packing—Free in London .. £250.

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

MACHINERY FOR THE MANUFACTURE OF CEMENTS.

The value of Cement depends to a very marked degree upon the care with which the mechanical processes connected with the manufacture are conducted. Taking this into consideration, we have arranged a set of Machines for the manufacture of Portland and other Cements, constructed upon the most approved principles, with a strict view to economy in cost, as well as in operation.

THE PLANT CONSISTS OF:

WASHING MILLS,

OF VARIOUS SIZES, FROM 12 FEET TO 36 FEET DIAMETER,

FOR WASHING AND INCORPORATING THE CHALK, CLAY, AND OTHER RAW MATERIALS.

CRUSHING MILLS,

EITHER HORIZONTAL OR VERTICAL, FOR CRUSHING THE STONE FROM THE KILN.

GRINDING MILLS.

IN THESE THE FINAL REDUCTION IS EFFECTED; PARTICULAR ATTENTION HAS BEEN GIVEN TO THEIR CONSTRUCTION TO DELIVER THE CEMENT IN THE BEST POSSIBLE CONDITION.

SIEVES AND SIFTERS, PUMPS, TESTING MACHINES, and all ACCESSORIES.

Prices on receipt of Particulars as to Quantity required in a certain time, Local Conditions, &c.

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

BRICK-MAKING MACHINERY.

The application of machinery to the manufacture of bricks has for its objects economy, certainty, and expedition of production, and improvement in the quality and appearance of the bricks. It is still a question how far these objects have been attained; and out of the large number of machines invented for brick-making, but few, omitting tile and pipe-making machines, are at present in regular work.

The Machines, however, described below can with confidence be recommended, both on account of simplicity of construction and working, and superiority of bricks produced.

JOHNSON'S PRIZE BRICK-MAKING MACHINE.

This Machine is capable of making 15,000 bricks in ten hours, with one man feeding and a boy cutting off. It can be adapted to almost any description of clay; and from the great pressure applied, a very solid and well-squared brick is produced; whilst, from the extreme simplicity of its construction, it is easily worked by those hitherto unaccustomed to machinery, and derangement is almost impossible. These Machines are also capable of working the clay direct from the natural formation without its having been dug and turned over. The side on which the hoist is required must be specified. The Machine can be driven by belt and pulley if required.

For temporary purposes a small Machine is made without the pug knives; the clay, therefore, is only acted upon by the screw, and requires to be dug and watered before coming to the Machine. This, however, enables a much less engine to be employed, and hence a very handy light tool is secured. It requires no fixing or foundation and is easily moved about from place to place, being set on wheels; the total weight, without water in the boiler, being under 2 tons. The quantity of bricks produced is about 10,000 in a day of ten hours.

PRICES.

No. 1. Machine complete, with brick die, driving wheel and pinion, ready to attach to engine	£	95
2. " " with crushing rollers, brick die, driving wheel, and pinion to attach to engine	£	195
3. " " with two pairs crushing rollers, brick die, driving wheel, and pinion to attach to engine	£	350
4. Portable Machine complete, with 6 horse-power engine and boiler, and set on wheels	£	190
Clay Hoist	£	15
Creper Gear	£	15
Extra, if packed in strong cases for export, £5 to £9 10s.		

SCHOLEFIELD'S PATENT BRICK-MAKING MACHINE.

This Machine is very simple in construction, requires no skilled workman to attend it, and all its parts being exposed, can be seen when working. It is very portable, being easily fixed to any existing plant at little cost, and does not easily get out of repair. It effects great saving in labour, as the material is worked up in the same state as taken from the ground, after passing through grinding rollers to crush all hard substances, and produces a better quality of brick. The bricks made by this Machine require no shed room for drying, as they are made in a semi-dry state, yet with sufficient moisture to preserve a good arridge, and are so dry that they can be taken direct from the machine to the kiln, thus greatly reducing the cost for fuel. It will make first-class pressed bricks from any description of material, as clay, bind, shale, or marl; and of any of the following shapes, namely, square, bull-nose, culvert, circular, and bevelled-corner, and the like; and can be altered to make any thickness of brick in a moment. This Machine, when driven by a 4 horse-power engine, is capable of turning out 10,000 bricks a day.

PRICE	£185
CLAY BREAKERS FOR ABOVE	£12 10s.

CHRISTOPHER SEARCH AND CO.,

ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

For the manufacture of Bodmer's Patent Compressed Stone Bricks of Sand and Lime, Blast-Furnace Slag and Lime, and similar materials.

The process of brick-making by this Machine is very simple. Hoppers are filled by hand with the materials employed, each into its separate hopper ; from this point to the removal of the finished bricks all operations are automatic. Measured portions of each ingredient are caused to fall upon a travelling belt, which delivers the mixture into an apparatus, in which it is thoroughly incorporated, and from which it is deposited upon a second travelling belt, which carries it to the press, where measured quantities are delivered into the moulds. The press is hydraulic, consisting of a circular table, revolving horizontally, and of course stopping when pressure is applied. The table contains six pairs of moulds, making, therefore, one-sixth of a revolution between the stoppages for application of pressure. Two pairs of moulds are subject to pressure at once, two other pairs being automatically filled, and the bricks rising out of the remaining two pairs simultaneously. The bricks are removed by hand to barrows, and conveyed to the yard, where they are left to ripen. The time required for this varies according to the quality of the lime used, and also according to the weather, from one to two months, but the hardening goes on for years. Seven strokes a minute are made by the press, giving in that time 28 bricks, or about 80,000 a week, as the result of the labour of two men and four boys, exclusive of wheelers and pilers. When sand is used, from one-sixth to one-eighth of its weight of lime is necessary, but with slag as little as one-sixteenth of its weight of lime may be employed to produce a good quality of building brick, weighing about 58 cwt. a thousand. The cost in wages varies from 3s. to 3s. 6d. a thousand. These bricks require no burning.

CLAY-CRUSHING ROLLING MILLS.

Complete, with Fast-and-Loose Pulleys, Gearing, and Fixing Bolts, to crush Clay for 12,000 to 15,000 Bricks a day	£	63
" " " " " "	"	66
" " " " " "	"	92
Pugging Mills, complete	£18, £20, and £25.	
" " large size, for power	£35, £45, to £60.	

COMBINED MILLS for CRUSHING AND PUGGING CLAY.

Size.	Power required.	Price.
A	2 Horses.	£ s. d. 82 0 0
B	5 "	95 0 0
C	7 "	150 0 0

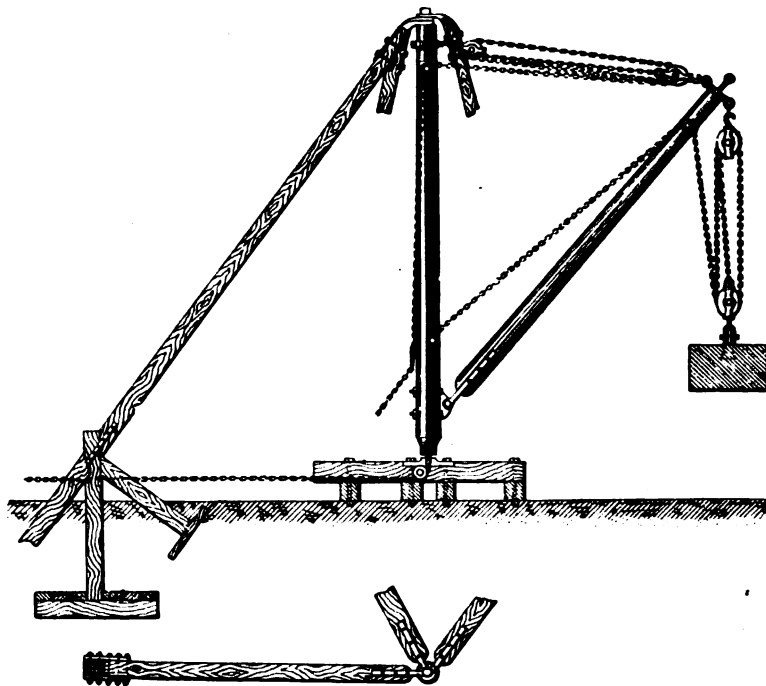
Complete, with every requisite for Crushing, Pugging, Moulding, and Delivering, mounted on Independent Foundation Plate, and including all Fittings.

Size.	Power required.	Average Make a Day.	Approximate Weight.	Price.
No.		Bricks.	tons.	£ s. d.
1	16 Horses.	25,000	10½	390 0 0
2	10 "	16,000	6½	250 0 0
3	8 "	12,000	5½	195 0 0
4	6 "	10,000	4½	169 0 0

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

HAND DERRICK CRANES.

FOR USE IN QUARRIES.



PRICES.

To lift 15 cwt., Jib 25 feet long	..	..	..	..	..	..	..	£	30
„ 1 ton „ 30	„	..	..	..	..	..	..	£	44
„ 1½ „ „ 40	„	..	..	..	..	..	..	£	55
„ 2 „ „ 40	„	..	..	..	..	..	..	£	70
„ 3 „ „ 40	„	..	..	..	..	..	..	£	97

STEAM DERRICK CRANES.

All Steam Cranes have revolving Gear, and an upright Boiler, supported on a suitable Platform. The lengths given below are those usually supplied for Steam Cranes; longer lengths are not advisable for 1½ or 2 tons; 3-ton Cranes have frequently 50-feet Jibs.

PRICES.

To lift 1½ ton, Jib 40 feet long	..	..	..	..	..	..	..	£	176
„ 2 „ „ 40	„	..	..	..	..	..	..	£	198
„ 3 „ „ 40	„	..	..	..	..	..	..	£	225

Other, or larger, sizes to Special Estimate.

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

BORING TOOLS.

Comprising Open Shell Augers, Shoe Shells, Flat Point Chisels, Diamond or Drill Point Chisels, Tee Chisels, Crow's Feet, Spiral Worms, Screw Augers, Spring Hooks, Lifting Dogs, Tillers, Hand Dogs, Boring Rods, short Swivel Rods, Pipe Tongs, Spring Darts, Bell Screws, &c., in all sizes from 1 inch and upwards. These Tools are warranted to be of the very best materials, make, and finish, and are supplied in sets or otherwise.

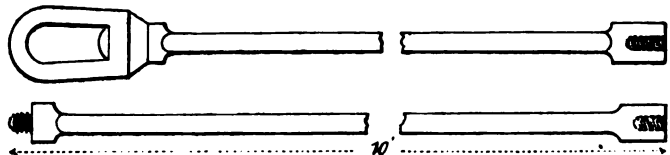
**PRICES, AND TOOLS USUALLY
SUPPLIED.**

SMALL SET, TO BORE TO 45 FEET.

One Spring Hook, one Swivel Rod, eight 5-feet lengths of $\frac{3}{4}$ -inch Rods, one Lifting Dog, two Hand Dogs, one pair of Tillers, one 2-inch Worm Auger, one 2-inch Flat Chisel, one 2-inch Shell Auger and Valve, one 2-inch Clay Auger.

Price complete, £17 10s.

*Drawings and Prices of Special Boring
and Sinking Tools on application.*



**CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.**

2 T

PARKINS' PATENT SIGNAL BELL.

This Bell is so constructed that it can be worked from any direction. The disc is of malleable cast iron, thereby ensuring durability and strength. There is only one spring attached to the bell, the catch being self acting. This signal is adaptable for Railways, Collieries, Steamboats, Locomotives, &c. ; and has now been in use for some time past at many of the largest Collieries, where it has given general satisfaction. Upwards of 600 are now working.

PRICES.

With 6-inch Bell	25s.	each.
„ 8 „	32s. 6d.	„
„ 10 „	45s.	„
„ 12 „	55s.	„

LARGER SIZES TO ORDER.

SPRINGS.

SMALL STEEL SPIRAL SPRINGS	1s.	each.
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Orders with not less than half a dozen Bells, gratis.

LARGE SPRINGS, TO BALANCE WIRE IN SHAFTS	4s. 6d.	„
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ELECTRIC SIGNALS.

	£	s.
SEVEN-INCH BELLS, IN PROPER CASE	4	0
RINGING PUSHES FOR DITTO	1	2
BATTERIES OF LARGE SIZE, FROM	0	6

Insulator Wire, Gutta-percha of all sizes, from £9 to £20 a mile.

Estimates of the cost of Electric Signals and Apparatus delivered and fixed, will be forwarded on application, and on receipt of the following particulars: Code of Signals required; Distances; Number of Bells and Pushes; and whether for Engine Plane or Shaft.

ORDINARY PULL SIGNAL BELLS,

VERY STRONG, 11 INCHES DIAMETER, £5; 7 INCHES DIAMETER, £2.

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

2 T 2

IMPROVED PIT-HEAD PULLEYS.

These Pulleys are of a superior description, adapted for flat or round wire ropes, and made of all sizes to order. The arms are of wrought iron, and spragged, giving the pulleys a light appearance, and at the same time great strength. The centre is hooped with wrought iron, and the hole for shaft is bored, which gives much greater truth in the rims. The shafts are of wrought iron, turned all over and keyed in. The pedestals are fitted with brass bottom steps and iron tops, carefully bored and turned to the shafts. These pulleys, if required, are furnished with the rims turned up, giving a perfectly true face—a very important consideration where high speeds are run; this gives great steadiness to the rope, and consequently reduces the wear and tear to a minimum.

PRICES FORWARDED ON RECEIPT OF PARTICULARS.

THE PRICES AND WEIGHTS OF ORDINARY PULLEYS WITH WROUGHT-IRON ARMS, FOR EITHER ROUND OR FLAT ROPES, ARE AS FOLLOWS:

	Diameter.	Weight.	Price.
ROUND ROPE PULLEYS ..	6 feet	6½ cwt.	£ 6 10 to £ 9
	8 „	9¾ „	9 10 „ 12
	10 „	13½ „	13 10 „ 16
	12 „	20 „	18 0 „ 20
FLAT ROPE PULLEYS ..	6 „	Varies	£ 12
	8 „	according	15
	10 „	to width of	20
	12 „	trod, &c.	24

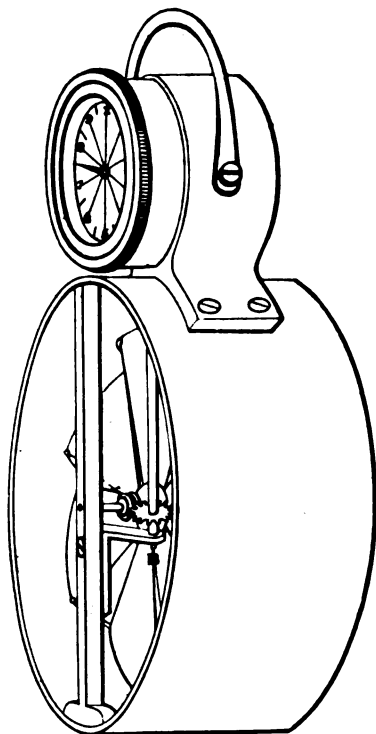
PRICES FOR ROUND ROPE PULLEYS, FITTED WITH GUDGEONS, CARRIAGES, BRASSES, &c., COMPLETE.

For a Working Load not exceeding 5 Tons, about—

Diameter—6 feet.	7 feet.	8 feet.	9 feet.	10 feet.	11 feet.	12 feet.
£25	£28	£33	£38	£43	£52	£65

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

MINE ANEMOMETERS.



For measuring the velocity of air currents in mines, shafts, or other underground workings, Anemometers composed of a small light fan wheel, whose motion is transmitted to a counter which registers the number of turns, are most certain and convenient for use, though they must previously be tested, or the relation existing between the velocity of the wind and the number of turns of the wings must be accurately determined.

“BIRAM’S ANEMOMETER.”

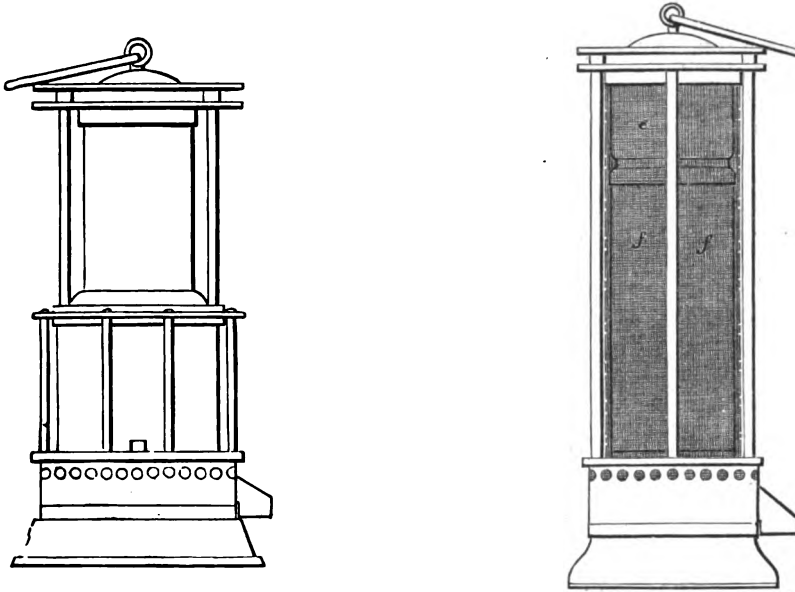
This Anemometer, which is the one most generally used in the coal mines of England, can be recommended with confidence; it self registers the velocity of the air through any passage of a mine in which it is placed, and is a sure detection of any slackening of the current, by neglect of the furnace, or obstruction in the air course, and a complete check against inattention in the furnace man. It is made in four sizes, 2, 4, 6, and 12 inches, is very portable, and is not, with proper care, liable to get out of order. Some of these instruments will continue to revolve in a current as low as 30 feet a minute, but with most of them a velocity of about 50 feet is required. The inaccuracy of each Anemometer at different velocities is carefully tested, and a certificate is issued with each instrument showing the amount of air in feet to be added or deducted, being the result of experiment with each Anemometer separately.

PRICE.

								£	s.	d.
No. A.	12 in.	diameter,	reading up to 10,000,000 feet	..	..	..	..	4	4	0
6	..	..	1000 feet	..	..	..	..	3	3	0
6	..	..	1000 .. with disconnecting motion	..	..	..	..	3	13	6
B.	4	..	100 ..	..	..	..	..	2	10	0
C.	4	..	new, reading up to 10,000,000 feet	..	..	..	..	4	4	0
D.	2	..	reading up to 100 feet	..	..	..	..	2	0	0
E.	2	..	new, reading up to 10,000,000 feet	..	..	..	..	3	15	0

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

SAFETY LAMPS.



The great requisites in all Lamps to be used in *Fiery* Mines are, safety from explosion, simplicity of construction, to give a good light, and that it shall be altogether impossible for the miner to expose the flame, or to relight it in the mine. All these advantages are possessed by the Lamps supplied by SEARCH AND CO., the working of which is of the most simple character.

These Lamps are perfectly safe, as it is impossible to expose the flame; they give double the light of the ordinary safety lamp at half the cost; they make no smoke or soot; are of the simplest construction; cannot get out of order; and require no picker.

Lamps are also manufactured by us for use as Shaft, Stable, or Pit Lamps, for which, as they give a strong and steady light, they are admirably suited.

PRICES.

	At per Dozen.
Ordinary Davy Lamps	96s., 48s.
Protector, Davy, Stephenson, or Clanny Lamps	150s.
„ Plate-Glass Sides and Fronts, Electro-plated Reflector,	
No. 1, one jet	66s.
„ Reflector, No. 2, one jet	78s.
„ „ No. 3, two jets	90s.
„ Japanned Shaft, Stable, or Pit Lamps, three jets	138s.
„ Globe Hand Lamps, one jet, Japanned	78s.
„ „ „ „ Brass	90s.
„ 7-inch Globe Lamps, two jets, Japanned	90s.
„ „ „ „ Brass	150s.
„ 9-inch „ „ three jets, Japanned	117s.
„ „ „ „ Brass	189s.
Prepared Colzalene, 2s. per gallon.	
Doria's Patent Safety Lamp	78s.

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

HEDLEY DIALS.

5-inch Hedley Dial	£9 15s.
5 " " with arc	£11 15s.
5 " " with rack and pinion, vernier, and arc	£13 15s.
Extra set of legs, one set of joints, and cup for lamp	£2 2s.

DUMPY LEVELS.

10 inch, 12 inch, and 14 inch, £11 10s., £12 10s., and £14.
Compass, 30s. extra.

TELESCOPE DUMPY LEVELS.

For Mine Levelling and Draining. 8 inch and 9 inch, £6 10s. and £7 10s.

WATER GAUGES.

Water Gauges, each	.. .. .	9 <i>s.</i>	6 <i>d.</i>
„ with screw	.. .. .	16 <i>s.</i>	
„ with level and screw	.. .. .	£1	

CLINOMETERS.

Rule Clinometer, with levels, compass, sights, and jointed staff complete	£3	5s.
Clinometer, with sights and compass, and useful tables on side ..	£1	18s.
„ without sights	£1	5s.
Best Plumb Bobs from 2s. to 5s.		

CROSS STAFFS.

Plain Cross Staffs, 6s. 6d. to 12s. 6d. Ditto, with compass, 12s. 6d. to 25s.
Ditto, with compass and vernier, 42s. Optical Squares, 21s.

PIT LEVELLING STAFFS.

9-feet Sopwith Staff, to close down to 3 feet 6 inches	..	..	..	£1 15s.
6 " " " 2 " 6 "	..	..	..	£1 12s.

DIALLING CHAINS, IRON,

With 10 links, brass each end	15s. 6d.
Standard Chains, all links brazed	50s., 75s., 55s.

ARROWS,

Set of 10. Iron, 1s. 6d. ; steel, 2s.

SURVEYING POLES.

6 feet, 3s. 8 feet, 3s. 3*d.* 10 feet, 4s. each.

OFFSET RODS.

Ten links, ferruled each end 4s. 6d.

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

SCREW RAIL-BENDER OR "JIM CROW."

This is a very useful Tool for Platelayers, Railway Contractors, &c. It is made of best hammered scrap iron, and has a machine-cut square thread screw. Weight about 90 lb.

Price, complete £4

PATENT "DUPLEX" LEVER PUNCHES.

OPEN-MOUTH PUNCHES.

PRICES.

			£	s.
No. 1.	To punch $\frac{1}{2}$ in. through $\frac{1}{2}$ -in. Plate.	Weight 25 lb.	6	15
2.	" $\frac{3}{4}$ in. " $\frac{3}{4}$ -in. "	" 42 lb.	8	10
3.	" 1 in. " 1-in. "	" 89 lb.	11	5

CLOSE-MOUTH PUNCHES.

No. 1.	To punch $1\frac{1}{2}$ -in. hole through $\frac{3}{4}$ -in. Iron Rails	.. .. .	27	0
2.	" $1\frac{1}{2}$ -in. " $\frac{1}{2}$ -in. Steel	.. .. .		

These Prices include one *round* punch and die of the largest size. Any other shape charged extra.

PATENT HYDRAULIC PUNCHING BEARS.

These Machines can be fitted in any position, and can be adapted to work either by hand or power. With the No. 1. Machine a man can punch three holes a minute. The space from centre of punch to back of gap for open mouth is $1\frac{3}{4}$ inch.

OPEN MOUTH.

PRICES.

			£	s.
No. 1.	To punch holes $\frac{3}{4}$ in. through $\frac{1}{2}$ -in. Plate.	Weight 64 lb.	10	0
2.	" 1 in. " $\frac{3}{4}$ -in. "	" 120 lb.	15	0
3.	" $1\frac{1}{4}$ in. " 1-in. "	" 320 lb.	26	0
4.	For 1-in. Steel Rails.			

CLOSE MOUTH.

No. 1.	To punch holes $\frac{3}{4}$ in. through $\frac{1}{2}$ -in. Plate.	Weight 80 lb.	14	0
2.	" 1 in. " $\frac{3}{4}$ -in. "	" 150 lb.	17	10
3.	" $1\frac{1}{4}$ in. " 1-in. "	" 250 lb.	26	0
4.	For 1-in. Steel Rails	" 350 lb.	38	0

EXTRA PUNCH AND DIE, IF SAME SIZE AS IN BEAR.

Round	10s. a pair.
Oval or Square	20s. "

HOISTING CRABS.

SIZES AND PRICES.

SINGLE PURCHASE.

			Without Brake.	With Brake.
			£ s. d.	£ s. d.
No. 1.	To lift 1 ton, with 1 to 2 sheave pulley blocks	.. .. .	3 0 0	4 2 6
2.	" $1\frac{1}{2}$ ton " "	.. .. .	3 7 6	4 12 6
3.	" 2 " " "	.. .. .	4 5 6	5 10 0
4.	" 3 " " "	.. .. .	5 0 0	6 10 0
5.	" 4 " " "	.. .. .	6 5 0	7 15 0
6.	" 6 " " "	.. .. .	7 5 0	8 15 0

If Brass Bushed, 25s. extra.

DOUBLE PURCHASE.

No. 10.	To lift 2 tons, with 1 and 2 sheave pulley blocks	.. .. .	5 5 0	6 10 0
11.	" 3 " " "	.. .. .	6 0 0	7 10 0
12.	" 4 " " "	.. .. .	7 7 6	8 17 6
13.	" 6 " " "	.. .. .	8 5 0	9 17 6
14.	" 8 " " "	.. .. .	10 0 0	12 0 0
15.	" 10 " " "	.. .. .	13 12 0	15 15 0
16.	" 12 " " "	.. .. .	17 5 0	19 10 0
17.	" 16 " " "	.. .. .	20 0 0	23 10 0
	If Brass Bushed, Nos. 10 to 12 .. .. .	.. .. .	1 7 6 extra.	
	" " 13 and 14 .. .. .	.. .. .	1 15 0 "	
	" " 15 to 17 .. .. .	.. .. .	2 0 0 "	

Any of these Crabs can be made with wrought-iron sides if required.

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

WROUGHT-IRON PULLEY BLOCKS.

LONDON PATTERN.

In this arrangement of Block, each plate forms a support for the centre shaft, besides protecting the Pulley from damage. The eye is supplied with the smallest Block of each pair ordered. The actual width of the grooves is from $\frac{1}{8}$ to $\frac{1}{4}$ more than List, so that $16 \times 3\frac{1}{2}$ is really $16 \times 3\frac{3}{8}$, and so on, to allow for new rope being larger. The Blocks have turned shafts, bright pulleys, and are bored. The 10×2 inch Pulley Blocks and above are made with rings instead of hooks.

GIN BLOCKS OR RUBBISH WHEELS.

PRICES.

Diameter of Pulley	3½	4½	6	7	8	9	10	11	12	14	16	18	20	22
Width of Groove	½	¾	1	1¼	1	1	1	1	1	1½	1½	1½	1½	1½
Price	5/9	6/3	7/0	7/9	8/6	9/3	10/0	11/0	12/0	13/0	16/6	21/0	24/0	27/6

PULLEY BLOCKS.

PRICES.

Diameter of Sheave.	Width of Groove.	Will take Chain Diameter.	Snatch Block.	1-Sheave Block.	2-Sheave Block.	3-Sheave Block.	4-Sheave Block.	Brass Sheave Blocks, each Sheave extra.
ins. 2½	¾	..	6/0	4/0	5/6	7/0	8/6	0/9
3½	1	..	6/0	4/6	7/0	8/6	10/0	1/6
4	1	..	7/0	5/9	8/6	10/6	12/6	2/0
4½	1¼	¾	8/6	7/6	11/0	14/0	18/6	3/0
5	1½	1	11/6	10/0	15/6	19/6	25/6	4/6
6	1¾	1¼	13/6	11/6	17/0	21/6	28/6	6/3
7	2	1½	16/6	14/0	24/6	30/6	46/0	7/9
8	2¼	1¾	21/6	19/0	35/6	48/6	63/0	11/6
9	2½	2	32/0	30/0	50/0	70/0	92/6	15/3
10	3	2¼	60/0	52/6	98/0	127/0	157/0	21/6
11	3½	2½	80/0	72/0	124/0	157/0	190/0	
12	3¾	2¾	110/0	98/0	144/0	190/0	222/6	
14	4½	3	140/0	110/0	170/0	222/6	280/0	
15	5	3½	170/0	130/0	203/0	262/0	352/0	
16	5½	4	210/0	164/0	242/0	310/0	400/0	

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

SELF-SUSTAINING ROPE PULLEY BLOCKS.

HEWITT AND GOFF'S PATENT.

These Blocks are suitable for Miners, Builders, Quarrymen, and Well Sinkers, and are valuable in all cases where large weights are to be speedily raised and left suspended. The advantages possessed by these Blocks are—The Weight can be sustained at any desired point. The Block is self sustaining, the Eccentric Brake being put in and out of action by moving the hand-rope to the right or left, or by pulling the rope upwards, and so causing it to touch the Guides. Being worked by a rope, the motion is quicker and steadier than that of any Chain Block. The extreme simplicity of its action renders it absolutely impossible to get out of order, as is often the case with Chain Blocks from the stretching of a link in the chain. To lower the Blocks pull the hand-rope an inch or two. This will release the Brake, and allow the rope to run freely through the hand.

PARTICULARS AND PRICES.

Number of Sheaves in Pair of Blocks.	Sufficient Best Rope for a	Diameter of Sheave Width of Groove ..	Inches. $2\frac{1}{2}$	Inches. $3\frac{1}{2}$	Inches. $4\frac{1}{2}$	Inches. $4\frac{3}{4}$	Inches. $5\frac{1}{2}$	Inches. $6\frac{1}{2}$
1 and 1 Sheave ..	10-feet Lift ..	.. .. .	<i>s. d.</i> 18 9	<i>s. d.</i> 20 0	<i>s. d.</i> 23 9	<i>s. d.</i> 28 6	<i>s. d.</i> 36 6	<i>s. d.</i> 41 6
" ..	12 " ..	.. .. .	19 6	21 0	24 9	29 6	38 0	43 6
" ..	15 " ..	.. .. .	20 0	22 6	26 0	31 6	41 0	46 0
" ..	20 " ..	.. .. .	21 6	24 6	28 6	34 0	45 6	51 0
1 and 2 Sheave ..	10-feet Lift ..	.. .. .	21 6	24 9	28 6	34 6	40 6	51 0
" ..	12 " ..	.. .. .	22 6	25 9	29 6	36 0	43 0	53 9
" ..	15 " ..	.. .. .	23 6	27 6	31 6	38 6	46 6	57 9
" ..	20 " ..	.. .. .	25 0	29 9	34 6	42 0	52 6	64 6
2 and 2 Sheave ..	10-feet Lift ..	.. .. .	25 0	29 6	33 0	41 6	56 6	61 6
" ..	12 " ..	.. .. .	25 6	30 6	34 6	43 6	59 6	66 0
" ..	15 " ..	.. .. .	26 9	32 6	36 9	46 6	63 9	71 0
" ..	20 " ..	.. .. .	29 0	35 9	40 6	48 9	71 0	79 6
2 and 3 Sheave ..	10-feet Lift ..	.. .. .	28 6	32 9	37 6	46 6	63 0	69 6
" ..	12 " ..	.. .. .	30 0	34 6	39 0	48 6	66 6	73 6
" ..	15 " ..	.. .. .	30 9	36 6	41 9	52 0	71 9	79 6
" ..	20 " ..	.. .. .	33 6	40 6	46 0	57 9	79 0	89 6
3 and 3 Sheave ..	10-feet Lift ..	.. .. .	31 6	36 6	41 9	52 0	70 0	77 6
" ..	12 " ..	.. .. .	32 9	38 0	43 9	54 9	74 0	82 6
" ..	15 " ..	.. .. .	34 6	40 9	46 9	58 9	80 0	89 6
" ..	20 " ..	.. .. .	37 6	45 0	52 0	65 6	90 9	101 0
3 and 4 Sheave ..	10-feet Lift ..	.. .. .	35 0	39 6	45 6	59 0	81 0	90 0
" ..	12 " ..	.. .. .	36 0	41 6	48 0	62 0	85 9	95 6
" ..	15 " ..	.. .. .	38 0	44 6	51 6	66 6	92 9	103 6
" ..	20 " ..	.. .. .	41 9	49 6	57 3	74 0	104 6	116 9
4 and 4 Sheave ..	10-feet Lift ..	.. .. .	38 6	43 6	51 6	66 0	90 0	101 0
" ..	12 " ..	.. .. .	40 0	45 9	54 0	69 6	95 0	107 0
" ..	15 " ..	.. .. .	42 6	49 6	58 0	74 6	103 0	116 0
" ..	20 " ..	.. .. .	46 0	55 0	65 0	83 0	116 0	131 0

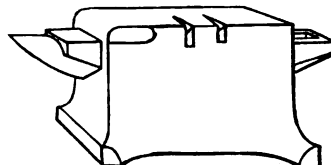
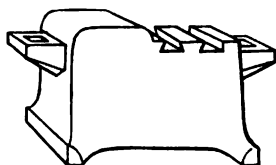
CHRISTOPHER SEARCH AND CO.,

ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

2 U 2

VICES.

Portable Vices with Iron Benches	..	..	..	..	..	..	..	50s. each.
Best Bright Staple or Flour Vices	..	..	..	..	..	..	..	4½d. a lb.
„ Black „ „	..	..	..	..	..	..	..	4d. a lb.
If Patent Solid Boxes and under 30 lb., 1d. a lb. extra.								
Parallel Vices with Steel Jaws. 6-inch Jaws	..	..	..	..	..	..	..	£4 15s.
„ „ „ 8-inch „	..	..	..	..	..	..	..	£6 15s.
Small Bench Vices	..	..	..	..	..	..	..	9d. a lb.
Vice Boxes and Pins	..	..	..	..	..	..	..	9d. „
	4	4½	4½	4¾	5	5½	5½	5¾ 6 inches.
Hand Vices	..	..	22s.	24s.	28s.	32s.	36s.	40s.
						44s.	48s.	52s. a dozen.



ANVILS.

	Best Best, War- ranted, with tied-in Bicks and Ends.	Second Best Ditto.	Common Bright Steeled Face.	Common Iron Anvils, Bright Face.
Smith's Anvil, ordinary shape ..	per cwt. 27/0	per cwt. 25/0	per cwt. 23/6	per cwt. 20/6
„ „ London	27/0	25/0	23/6	20/6
Double Arched Anvil	27/0	25/0	23/6	20/6
Round Bick Farrier's Anvil ..	27/0	25/0	23/6	20/6
Double Bick Anvil	21/0	26/0	24/6	21/6
Boiler Maker's Anvil	29/6	} Best Quality only.		
Soho Anvil	29/6			
Portable Anvil	33/6			

DENAYROUZE'S AÉROPHORE.

This Apparatus, which is largely used in France and Germany, is constructed for the purpose of enabling the Miner to penetrate at once and to a long distance workings which are foul with choke-damp, and to remain there a considerable time, carrying with him his lamp, and having the free use of his hands and arms, and without any risk or danger. Prices and full descriptive particulars of this apparatus can be had on application.

CHRISTOPHER SEARCH AND CO.,

ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

Crucible Cast-Steel Tram and Corve Wheels, Pedestals, and Axles.

These Wheels are from one-half to one-third lighter than cast iron. They cannot be broken while working, even with rough usage, and will wear twelve times as long as cast iron, thus saving animal and steam power, and reducing wear and tear immensely. The arms of these Wheels are constructed upon the curved principle, consequently the shrinkage or cooling of the castings is not interfered with, thus securing the greatest advantages of this very strong material. These Wheels are fitted upon the Axles by Hadfield's Patent Process, the advantages of which are, that the Wheels being forced upon a taper square-ended Axle, by machinery, and then riveted, the machine securing truth, it is impossible that they can come loose or get within gauge. They are very cheaply fitted on, and run very true.

PRICES.

Crucible Cast-Steel Wheels	.. .. .	36s. per cwt.
" " Pedestals	.. .. .	46s. "
Bessemer Steel Axles (plain round)	.. .. .	25s. "

PRICES FOR FITTING, ON HADFIELD'S PATENT PROCESS.

Wheels.	Outside Bearings.	Inside Bearings.	Wheels.	Outside Bearings.	Inside Bearings.
inches.	the set.	the set.	inches.	the set.	the set.
14	7/6	6/0	10	7/6	5/0
13	7/6	5/9	9	7/6	4/9
12	7/6	5/6	8	7/0	4/6
11	7/6	5/3	7	7/0	4/6

IMPROVED SAW BENCHES.

These Benches have planed tops, loose-and-fast pulleys, improved fence, adjustable sliding plate, and mounted on a strong cast-iron frame.

No.	Size of Bench.	Saw.	Extra for Striking Gear.	Diagonal Fence.	Weight.	Pulleys.	Price.	Remarks.
	ft. in. ft. in.	inches.			cwts.		£ s.	
0	3 6 by 2 0	24	20/0	40/0	4½	8 by 3	12 0	
1	4 0 2 0	30	22/6	40/0	5½	9 4	13 10	
2	5 0 2 6	38	22/6	45/0	9½	9½ 5	22 0	
3	6 0 2 9	42	25/0	48/0	12	12 5	26 0	
4	7 0 3 3	54	40/0	52/0	27	16 5½	48 0	
0 A	3 6 2 0	24	..	..	5½	8 3	20 0	
1 B	4 0 2 3	30	..	..	9	9 4	25 0	
2 C	5 0 2 6	38	..	..	12	9½ 5	32 0	

} Rise and Falling
Spindles.

CHRISTOPHER SEARCH AND CO.,

ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

BURY'S PATENT INTERCHANGEABLE SOLID CAST-STEEL PICKS.

These Picks are made of a superior quality of cast steel, and will attack the hardest substance without yielding. They wear longer and work more effectively than the ordinary iron Pick; never require re-steeling; and are guaranteed to do five times the work of an iron Pick without need of re-sharpening. The shafts and blades being interchangeable, only one shaft is required for any number of tools; and as they can be attached to, and detached from, each other instantly, this will be found a great advantage to road and railway contractors, miners, and others, who have to carry their tools some distance to their work. Upwards of 100,000 have already been sold, and are giving universal satisfaction. Each tool is stamped with *a lion*, and the words "Bury's and Co., Sheffield."

PRICES.

Miners' and Stone Picks, Hoop Pattern, Solid Steel Blades :									
No.	Weight of Blades and Hoops.								Price.
0	..	..	..	..	..	2 lb. each	..	..	1s. 9d. each.
1	..	..	..	..	..	2½ "	..	..	2s. 0d. "
2	..	..	..	..	..	3 "	..	..	2s. 3d. "
3	..	..	..	..	..	3½ "	..	..	2s. 6d. "
4	..	..	..	..	..	4 "	..	..	3s. 0d. "
5	..	..	..	..	..	4½ "	..	..	3s. 3d. "
6	..	..	..	..	..	5 "	..	..	3s. 6d. "
7	..	..	..	..	..	5½ "	..	..	3s. 9d. "
8	..	..	..	..	..	6 "	..	..	4s. 3d. "
Stone and Quarry Picks, 7 lb. and upwards									8d. a lb.
Shafts fitted with hoop, 1s. 9d. each.									
Railway, Navy, and Road Picks, hoop pattern, solid steel blades. Made to									
any pattern or shape									8d. "
Railway Beaters									9d. "
Shafts fitted with hoop, 2s. each.									

PICKS.

Double point, or point and chisel, solid eyes : Steeled bright point, according to quality										30s. to 34s. per cwt.
Best steeled, polished ditto, japanned or best self colour										38s. per cwt.
Cast steel, all bright, blued, or japanned										45s. „
Stone and Quarry Hammers, good quality and medium sizes										34s. „
Gold Diggers' Driving Picks, point or chisel ends, 2½ lb. to 3½ lb. each										15s. a dozen.
Ditto ditto solid cast-steel ends, best finish										22s. „
American pattern, solid cast steel, fine curved Mining Picks, best finish :										
4½	5	5½	6	6½	7	7½	8 lb. each.			
34s. 6d.	37s.	39s.	41s.	42s. 6d.	44s. 9d.	49s. 6d.	54s. 8d. a dozen.			
Cornish or Australian Miners' Picks :										
4½	4½	4¾	5½	5½	5½	5½ lb. each.				
19s.	20s. 6d.	22s.	23s. 6d.	25s.	26s. a dozen.					
Solid cast-steel ends, 9s. a dozen extra.										

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

PICKS AND HAMMERS.

Platelayers' Beating Picks	41s. 0d. per cwt.
Clay Picks	41s. 0d. „
Single-end Picks	26s. 6d. „
„ well steeled	35s. 6d. „
Keying Hammers, well steeled	48s. 0d. „



Miners' Jumpers, chisel ends	25s. 0d. a dozen.
Miners' Drills „	21s. 0d. „

Handled Coal Hammers :

1½	2	2½	3	3½	4 lb. each.
10s. 6d.	12s.	14s.	17s.	20s.	22s. a dozen.
Nailing Hammers, chequered face					6½d. a lb.
Pin Mauls					5½d. „

WHEELBARROWS—WROUGHT-IRON.

ARRANGED EXPRESSLY FOR EXPORTATION.

These Barrows are of the most simple construction and greatest strength ; the frames are so made that 60 may be packed in the space required for 5 on the old principle, and they can be put together in a few minutes. The bodies being all of the same size, several may be ordered for each frame.

PRICES ON APPLICATION.

BARROW WHEELS—CAST-IRON £15 a Ton.

Cast-Iron Swages	14s. 6d. per cwt.
“ Water Boshes	14s. 6d. „
Sledge Hammers	50s. 0d. „
Water Tuyere Iron	1s. 4d. an inch.
Bright Steel Grease-Knives	12s. 6d. a dozen.

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

SHOVELS.

CORNISH, DEVONSHIRE, OR IRISH MINERS' SOCKET SHOVELS.

No. 1. 10 in. by 12 in. 15s.	No. 2. 10½ in. by 12½ in. 16s.	No. 3. 11 in. by 13 in. 17s.	No. 4. 11½ in. by 13½ in. 18s.	No. 5. 12 in. by 14 in. 19s. a dozen.
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If Steeled, 4s. a dozen extra.

BEST CAST-STEEL SQUARE OR GRAVEL SHOVELS.

Extra long Socket, ½ Bright, Riveted Eye Handles.

No. 1. 9½ in. by 12 in. 64s.	No. 2. 10 in. by 12½ in. 66s.	No. 3. 10½ in. by 13 in. 68s.	No. 4. 11 in. by 13½ in. 70s. a dozen.
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BEST CAST STEEL ALL THROUGH CENTRE STRAP, SQUARE OR ROUND NOSED SHOVELS.—½ Bright.

No. 1. 9½ in. by 12 in. 74s.	No. 2. 10 in. by 12½ in. 76s.	No. 3. 10½ in. by 13 in. 78s.	No. 4. 11 in. by 13½ in. 80s. a dozen.
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SOCKET COAL SCOOPS OR FIRING SHOVELS.—Riveted D Handles.

No. 1. 10 in. by 14½ in. 60s.	No. 2. 10½ in. by 15 in. 64s.	No. 3. 10½ in. by 15½ in. 66s.	No. 4. 11 in. by 16 in. 70s. a dozen.
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IMPROVED ALL STEEL SQUARE-MOUTH SHOVELS.—Crutch or Eye Handles.

No. 1. 9½ in. by 12 in. 36s.	No. 2. 10 in. by 12½ in. 38s.	No. 3. 10½ in. by 13 in. 40s.	No. 4. 11 in. by 13½ in. 42s.	No. 5. 11½ in. by 14 in. 44s.	No. 6. 12 in. by 14½ in. 47s. a dozen.
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Riveted Eye Handles, 2s. a dozen extra.

" " Ground Half Bright, 6s. a dozen extra.

IMPROVED ALL STEEL SQUARE-MOUTH FIRING SHOVELS.

3 ft. 6 in. Crutch Handles.

No. 6. 12 in. by 14½ in. 51s.	No. 7. 12½ in. by 15 in. 54s.	No. 8. 13 in. by 15½ in. 57s.	No. 9. 13½ in. by 16 in. 60s.	No. 10. 14 in. by 16½ in. 63s. a dozen.
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IMPROVED ALL STEEL ROUND-MOUTH SHOVELS.—Crutch Handles.

No. 1. 10 in. by 12 in. 38s.	No. 2. 10½ in. by 12½ in. 40s.	No. 3. 11 in. by 13 in. 42s.	No. 4. 11½ in. by 13½ in. 44s.	No. 5. 12 in. by 14 in. 46s.	No. 6. 12½ in. by 14½ in. 49s. a dozen.
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Long Knob Handles, Ground Half Bright, 6s. a dozen extra.

SINKERS' ROUND-NOSED SHOVELS.—2-feet Handles.

No. 1. 10 in. by 12 in. 32s.	No. 2. 10½ in. by 12½ in. 34s.	No. 3. 11 in. by 13 in. 36s.	No. 4. 11½ in. by 13½ in. 38s.	No. 5. 12 in. by 14 in. 40s. a dozen.
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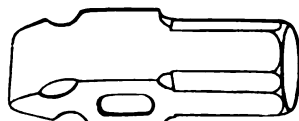
COKE SCREENS.

Small size	94s. a dozen.
Large ,,	100s. ,,



SUNDRIES.

STONE SPLITTING WEDGES, in Sets, Steeled and Ground..	28s. per cwt.
SMITHS' SLEDGE HAMMERS, Bright Face	33s. ,,
" " Double Bright Face	36s. ,,
SMITHS' HAND HAMMERS, Bright Face	35s. ,,
WROUGHT-IRON BARROW WHEELS	36s. ,,
GRINDSTONE SPINDLES	38s. ,,
LEAD LADLES	52s. ,,



CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

SHAFT OR WELL SINKING TOOLS.

Solid Steel Drills, ready finished, about 65s. per cwt.

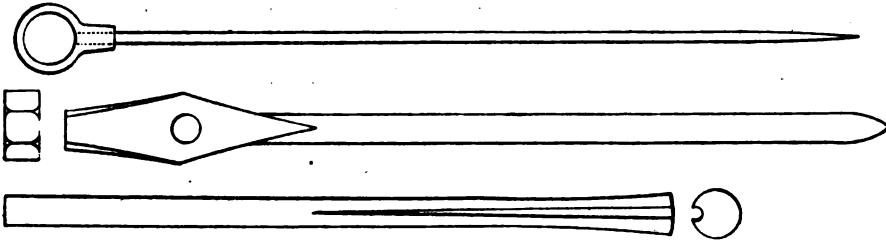
Sinking Drill Steel, in Bars, octagon, any size :

1 inch, 1½ inch, 1¾ inch, 1⅞ inch, about 55s. per cwt.

Skewers and Prickers :

2 ft.	2 ft. 3 in.	2 ft. 6 in.	3 ft.	3 ft. 6 in.	4 ft.
3s. 6d.	3s. 10d.	4s. 3d.	4s. 6d.	5s. 3d.	6s. 6d.

Composition Rammers of all kinds 1s. 8d. per lb.



PATENT TUYERE.

This Patent Tuyere, manufactured by Messrs. Thwaites and Carbitt, does not require any water jacket, and is suitable for all kinds of Smith's work.

PRICES.

Patent Tuyere, with four spare Blast Grids	.. .. .	39s. each.
Spare Blast Grids for Patent Tuyere	.. .. .	1s. 6d. each.

CART AND WAGON GREASE, £14 to £20 A TON.

TIMBER.

Squared Norway, 6 to 10 inch side	.. .. .	38s. a load calliper.
„ Mining ditto, 5 to 8 inch quarter girth	.. .. .	47s. „ string.
Round R ditto, 4 to 6 inch girth	.. .. .	40s. „ „

Brattice Cloth, 7d. to 10d. a yard, according to quality.

Waterproof Blasting Bags, from 7s. 6d. a dozen, according to size.

Prices of Cast or Wrought Iron Puncheons or Props on application.

NAILS.

	12 to 7	6	5	4	3½	3	2½	2	1½	1 inch.	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	
Wrot. Spikes and Rose ..	19 6	20 0	22 0	24 0	25 6	27 6	29 6	31 6	38 0	..	per cwt.
Wrot. Fence	..	..	..	25 0	26 6	28 6	..	..	..	..	„
Best Csk. Clout	..	..	..	28 0	28 6	29 0	30 0	35 6	40 0	48 0	„
Patent Pressed	..	23 0	23 0	24 0	25 0	26 6	27 6	29 6	33 0	..	„
Cut Clasp and Rose ..	..	17 0	17 0	17 0	17 0	17 0	17 6	18 0	19 0	22 0	„
	3½	4 × ½		3½	4 × ⅞		3	3½ × ⅞		3 × ⅞	
Brobs	19s.			20s.			23s.			27s.	„

CHRISTOPHER SEARCH AND CO.,

ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

2 X

POWDER AND FUSES.

Blasting Powder, of good quality	From 38s. per cwt.
Curtis and Harvey's ESM Powder	£5 ..
Dynamite	£10 ..
Lithofracteur	£8 15s. ..

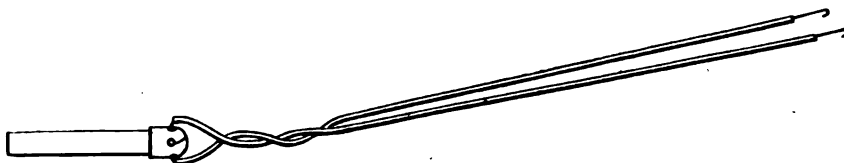
GUNPOWDER DETONATORS.

When fired by means of these Detonators the strength of a charge of Gunpowder is quadrupled.

ANDRÉ DETONATORS, the box of 100	£1
SPECIAL EXTRA STRONG DETONATORS, for exploding charges of Gunpowder	
from one hundred-weight and upwards	5s. to 21s. each.
DETONATORS for Dynamite or Lithofracteur, warranted	42s. a thousand.

FUSES.

FOR CONVEYING FIRE TO THE CHARGE IN BLASTING ROCKS, &c.



BRAIN'S HIGH-TENSION FUSES.

These Fuses are specially adapted for exploding Dynamite by means of a Siemens' Dynamo-Electric Machine, and as many as 100 can be fired simultaneously.

PRICE.

6s. a Dozen, fitted with Detonators and 3-feet Wires.

Dynamo-Electric Machines	£25 each.
Magneto-Electric Exploders and Frictional Machines	From £8 8s.

Cables of insulated Wire, for connecting the Machine with the Fuses, vary in price according to the nature of the work.

ELECTRIC BLASTING STICKS, 12s. 6d. a hundred, fitted with Detonators and 3-feet Wires.	
„ „ with André's Gunpowder Detonators, and Wires, 25s. a hundred.	

BICKFORD'S PATENT SAFETY FUSES.

No.	Description	The Coil of 24 feet.
2.	For use in dry ground	4d.
3.	White, for use in dry and close places	4d.
4.	Red, for use in very damp and close places	4½d.
6.	Thread Sump, for use in wet ground	5d.
8.	Tape Sump, for use in wet ground	6½d.
10.	Treble Countered, for use in very wet ground, and will bear rough treatment	7½d.
12.	Small Gutta-percha, for use in very wet ground, or in water	10d.
22.	Treble Wave, a very superior Fuse, adapted to almost every mining requirement	6d.
24.	White Double Tape, for use in very wet and close places, and for exportation into hot climates	9d.

Drawings and information of the most advanced and economical practice in every variety of Blasting Operations furnished on application.

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

THE GENERAL ENGINE AND BOILER CO.,

8, UNION COURT, OLD BROAD STREET,

LONDON.

ECONOMICAL STEAM POWER GUARANTEED.

COMPOUND CONDENSING ENGINES.—Compound Engines have of late years been largely employed. When properly designed and thoroughly well made they work with great economy. But a bad Compound Engine may be much more wasteful than an ordinary Engine. We undertake the erection of either Vertical or Horizontal Compound Engines of any power, under a strict guarantee as to fuel consumption.

WINDING ENGINES.—Our Portable Winding Engines are very convenient for light winding and sinking, as the whole arrangement can be moved to another site.

For larger Mines and Collieries our Vertical or Horizontal Pumping Engines are recommended.

BLOWING ENGINES.—Our Compound Blowing Engines are guaranteed to burn about half the usual quantity of fuel. As Ventilating Engines, our Patent Horizontal Engines are admirably adapted, and are coupled direct to the Fan Shaft. We have also a special type of Air-Compressing Engine.

ROLLING MILL ENGINES.—Reversing Engines are generally displacing the old and dangerous Engines with Fly Wheels and Clutches. Plans and Estimates for Engines of any power on application.

LAUNCH AND YACHT ENGINES.—Light High-Pressure Engines, with or without Boilers, Propellers, &c., for either Paddle or Screw Yachts, Compound Engines, Special Engines for Racing Launches, and Engines and Boilers for Barges or Tug Boats, &c.

"EXAMPLES OF ENGINES, BOILERS, AND STEAM MACHINERY."—Our complete Catalogue and Price List, quarto size. Post free, 1s.

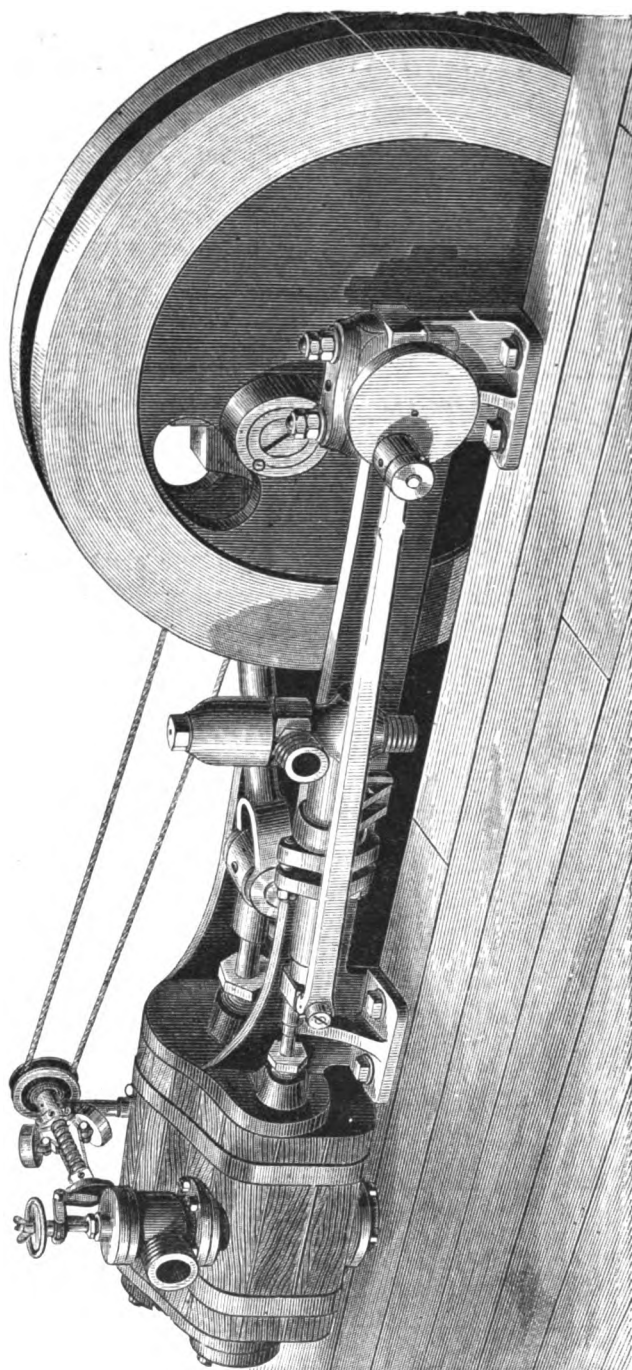
"USEFUL INFORMATION ON STEAM POWER."—Intended as a Guide to the choice of a suitable Steam Engine, and the attainment of Economical Steam Power. By Henry Northcott, C.E. 5th edition. Post free, 1s.

THE GENERAL ENGINE AND BOILER CO.,

8, UNION COURT, OLD BROAD STREET, LONDON.

2 X 2

PATENT HORIZONTAL "EXPRESS" ENGINES.



These Engines are carefully designed, thoroughly well made, and work with about *one-half the usual consumption of fuel.* The Engine is perfectly balanced by the employment of two counterweighted Fly-Wheels, the Valve is an equilibrium Slide Valve, the Framing is arranged to withstand the thrust and pull of the Piston in the direct line of strain, and the Engine is self-contained, requiring but very slight foundation.

N.B.—THE INDICATED HORSE-POWER given is that due to a Steam pressure of 50 lb. per inch. With a higher pressure and speed a much greater power will be exerted.

"Such novelties as are introduced into these engines will, we think, commend themselves to the judgment of competent engineers."—*The Engineer.*

"These engines are certainly calculated to work with less coal than the rough and heavy engines ordinarily employed for

small powers."—*Mining Journal.*

"It would be difficult to make a lighter or more rigid framing for an engine, and in appearance also it is very satisfactory."—*Iron.*

"Very favourable examples of this class of engine."—*Colliery Guardian.*

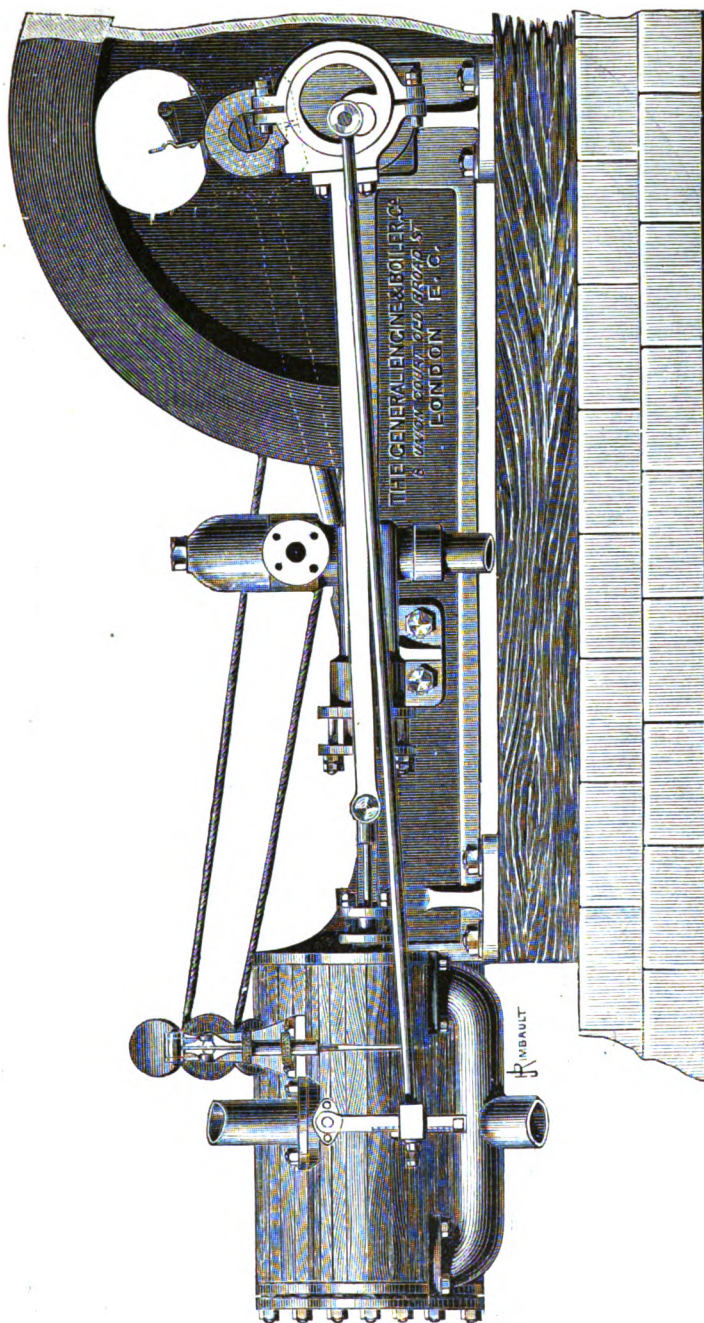
Nominal Horse-power	..	2	3	5	7	9	12	16	20	25	30
Indicated Horse-power	..	2½	5	8½	13½	19	25	33	40	48	56
Price of Engine	..	£	..	52	60	74	90	124	145	170	190
Governor and Stop Valve	..	£	3	4	5	6	8	10	12	14	15
Feed Pump	..	£	2	3	4	5	6	8	10	12	14

Estimates for any kind of Engine and Boiler on application.

THE GENERAL ENGINE AND BOILER CO.,
8, UNION COURT, OLD BROAD STREET, LONDON.

PATENT HORIZONTAL EXPANSIVE ENGINES.

"A rare combination of strength, lightness, and durability."—*Mining World*.
 "Calculated to work with great economy of fuel."—*Colliery Guardian*.
 "A very superior type of this class of engine."—*Iron Trade Exchange*.



These Engines are fitted with patent automatic variable expansion gear, under the control of the governor. The cylinders are steam jacketed, and neatly cased to prevent radiation of heat. The workmanship and materials are of the highest class.
 When working fully up to the nominal power, and with a patent Feed-Water Heater, these Engines are as economical as most condensing Engines.

Nominal Horse-power	8	10	12	16	20	25	30	40	50	60	75	100
Indicated ditto, according to the rate of expansion, from	13	16	20	25	32	40	50	65	80	90	110	150
(Steam pressure 60 lb.)	to	to	to	to	to	to	to	to	to	to	to	to
PRICE, complete with governor, feed pump, two fly wheels, &c.	20	25	32	38	50	65	80	100	130	150	170	220

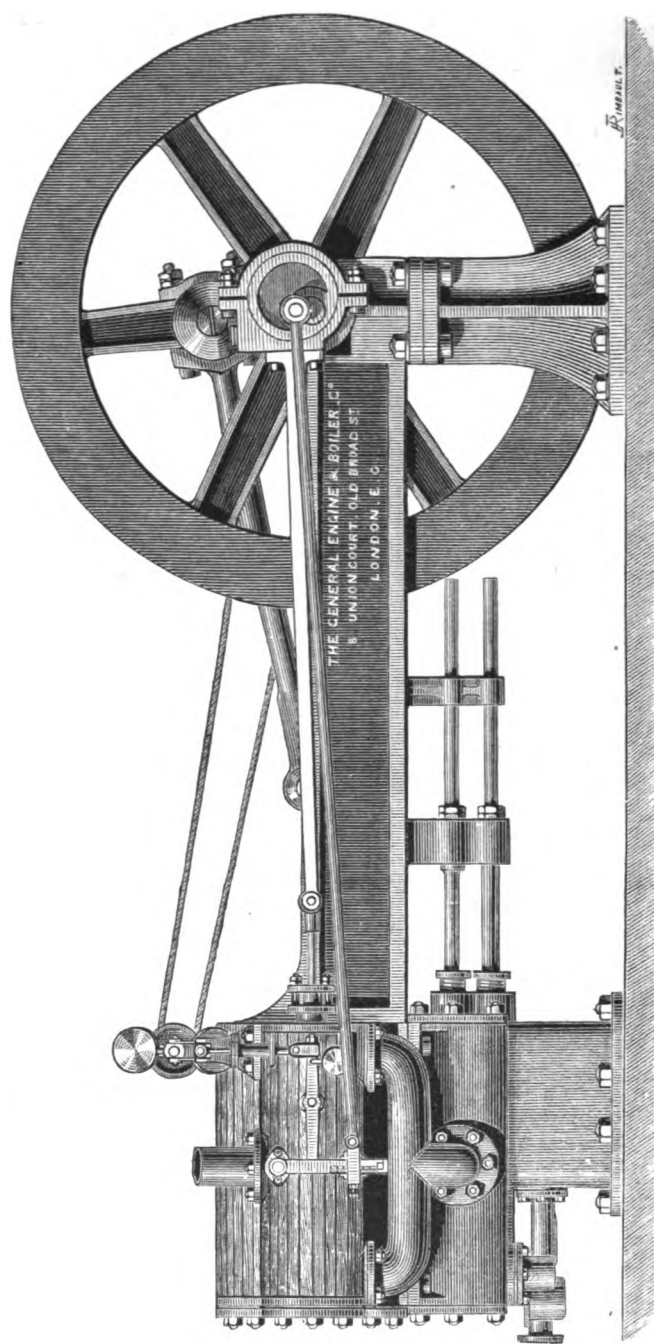
ESTIMATES FOR ANY KIND OF ENGINE AND BOILER, ON APPLICATION.

THE GENERAL ENGINE AND BOILER CO.,
 8, UNION COURT, OLD BROAD STREET, LONDON.

PATENT HORIZONTAL CONDENSING ENGINES.

These Engines use high-pressure steam considerably expanded and condensed, and run at the moderately high speed of about 400 feet per minute. The Cylinders are steam jacketted and lagged. The main valve and the expansion valve are both equilibrium slide valves, and each Engine is fitted with Northcott's Patent Automatic Variable Expansion Gear, whereby the degree of expansion and consequently the quantity of steam used are adjusted in accordance with the varying loads upon the Engine.

The consumption of fuel is from 2 to 2½ lb. per horse-power per hour when the Engine is working fully up to its nominal power. If both Engine and Boiler are supplied by us, an *economical performance will be guaranteed*.



"The arrangement of the crank is very neat and mechanically scientific."—*Practical Magazine*.

"With this disposition of parts the Engine is rendered very compact, and every part of it is accessible and exposed to view."—*Chambers of Commerce Chronicle*.

"It has been found that the consumption of fuel an hour is, per horse-power, from 2 to 2½ lb. when using high-pressure steam, and working fully up to their nominal power—a degree of economy but seldom exceeded by the best compound engines."—*Mining World*.

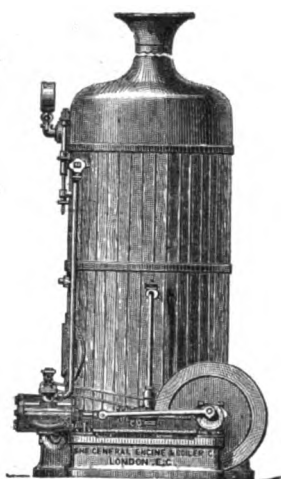
THE GENERAL ENGINE AND BOILER CO.,
8, UNION COURT, OLD BROAD STREET, LONDON.

COMBINED ENGINES AND BOILERS.

These Engines are the Patent "Express" Engines shown on page 340. The Vertical Boilers are of extra quality, and proved to double the working pressure before delivery. The combined arrangement is complete, and ready to be set to work on delivery.

The Price includes Engine, with feed pump, stop valve, governor, &c. ; Vertical Boiler and all usual fittings ; bed plate, with draught regulator, &c., and all connecting pipes.

Nominal Horse-power	2	3	5	7	9	12
Indicated Horse-power, with 50 lb. steam	2½	5	8½	13½	19	25
Price, complete	£80	£100	£120	£145	£180	£220



NORTHCOTT'S PATENT FEED-WATER HEATER

Saves 15 per cent. Fuel, reduces the wear and tear of the Boiler, and lessens priming. It is simple, inexpensive, easily applied, and its cost is repaid in a few months.

Numbered Size	2	3	4	5	6	7	8
For Engines of Horse-power	5	10	15	20	30	40	50
Price of Heater	£4	£6	£8	£10	£14	£18	£22

PATENT VALVELESS ENGINES.

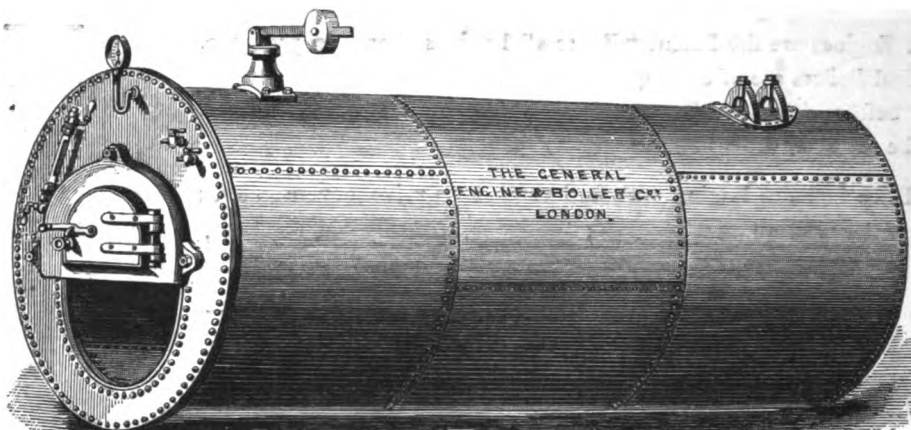
Although these Engines are free from all kinds of complications, they work expansively and with greater economy than any Engine of the same price made. Their extreme simplicity and non-liability to get out of order render them particularly suitable for export. About 1000 Engines are in use, varying in size from 1 to 200 horse-power.

HORIZONTAL ENGINES.											VERTICAL ENGINES.							
Nominal Horse-power	1½	2½	4	6	8	10	12	15	20	25	1½	2½	4	6	8	10	12	15
Diameter of Cylinder	3½	4½	6	8	9	10	11	12	14	16	3½	4½	6	8	9	10	11	12
Engine	£16	25	34	50	63	76	88	110	125	166	14	22	30	44	55	66	80	95
Governor, extra	£6	7	8	9	9	10	11	12	17	19	6	7	8	9	9	10	11	12
Feed Pump, extra	£4	5	5	7	8	10	11	12	12	15	4	5	5	7	8	10	11	12

N.B.—The indicated Horse-power is from two to three times the nominal, according to the pressure of steam used.

THE GENERAL ENGINE AND BOILER CO.,
8, UNION COURT, OLD BROAD STREET, LONDON.

CORNISH BOILERS.



The Price includes Boiler, with manhole and mudhole covers, fire bars, bearers and dead plate, fire door and frame, anti-priming pipe or steam dome, safety valve, water gauge, try cocks, pressure gauge, &c. Each Boiler is tested by hydraulic pressure before delivery.

Nominal Horse-power Price, with fittings ..	4	6	8	10	12	16	20	25	30	40
	£60	£80	£100	£115	£135	£170	£205	£250	£300	£400

For particulars of Cornish Boilers suitable for 70 lb. pressure, and with conical circulating tubes in the flues, see The General Engine and Boiler Company's Catalogue.

VERTICAL BOILERS WITH CROSS TUBES.

The price includes Boiler, with cross tubes in flue, fire door, fire bars, safety valve, pressure gauge, water gauge, try cock, blow-off tube, check valve, &c.

Nominal Horse-power Price	1	2	3	4	5	6	8	10	12	14
	£1	£2	£3	£4	£5	£6	£8	£10	£12	£14

For full particulars of these Boilers, and also of a very superior class of Vertical Boiler for highest pressures, see pages 27 and 28 of Complete Catalogue.

MULTITUBULAR BOILERS.

Vertical, Multitubular, and Horizontal Multitubular Boilers of ordinary construction, and also of our A 1 class, are fully described and illustrated on pages 25, 26, 31, and 32 of Complete Catalogue. Prices on application.

NORTHCOTT'S PATENT HIGH-PRESSURE BOILER,

Designed especially for pressures of from 60 to 200 lb. per inch, combines the simplicity of the Cornish and the compactness of the Multitubular Boiler, with a greater degree of safety and a higher evaporative efficiency than is possessed by any steam generator yet introduced.

Nominal Horse-power Price	6	8	10	12	16	20	25	30	40	50	60	75	100
	£90	£110	£130	£150	£190	£225	£270	£315	£410	£505	£600	£750	£1000

The General Engine and Boiler Company, under suitable conditions, guarantee the highest practicable evaporative efficiency.

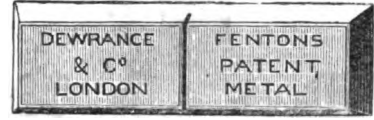
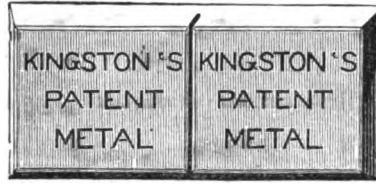
THE GENERAL ENGINE AND BOILER CO.,
8, UNION COURT, OLD BROAD STREET, LONDON.



PATENT ANTI-
FOR MACHINERY AND



FRICTION METALS.
AXLE BEARINGS.



These Anti-Friction or White Metals are too well known to require either description or testimonial at this date—the former Metal having established for itself a valuable reputation amongst Engineers and Mechanics generally for wearing well and greatly decreasing friction when used as a lining for steps, eccentric straps, slide valves, blocks, &c., in all cases whether of light or heavy pressure, and therefore economizing power, wear and tear, and lubricative material.

JOHN DEWRANCE AND CO. still exercise the same care in the mixture and manufacture of these Metals, made from only the best materials, which, together with their long experience for upwards of twenty-four years, has secured and continues to them the chief supply to most of the Railway, Railway Carriages, Steamship, and Engineering Companies, and is therefore a guarantee of the quality supplied in the execution of all orders with which J. D. and Co. may be favoured.

The advantages of the use of our Patent Anti-Friction Metals, which we supply to most of the leading Railways and Engineers, may be seen from the results of the working of an experiment with one of the South-Western Railway Carriages, and which are well worthy of the attention of Engineers, not only as showing the large saving in the material by the durability of the metal, but as also showing the very great saving in traction power by the use of our Patent Anti-Friction Metals.

The axle boxes in use on the South-Western Railway are "Beattie's Patent Oil Boxes," fed with oil from the bottom, and the following is the report of the performance of the boxes and bearings :

EXPERIMENT WITH NO. 35 SECOND-CLASS CARRIAGE.

"This Carriage commenced running August 29th, 1864, and has continued running every week day to Exeter and back until this date (May 12th, 1865), and is still working satisfactorily.

"During the whole of this period an Examiner has travelled with it and carefully noted its working ; an accurate account has also been kept of the quantity of oil used, and the loss in weight of the bearings.

"The weight of the Carriage was 6 tons 10 cwt., running on four wheels, bearing 6 by 3 inches ; Axle Boxes Beattie's Patent, Brass Bearings lined with Babbitt's Patent Metal ; oil only was used.

"Total weight of bearings (4) 23 lb. 8 oz.	Oil used 3 qts. 1 pint.
Total miles run (exclusive of shunting) 65,264.	Loss of weight in bearings 6½ oz.

Equal to a loss of 1¼ oz. per bearing, showing the proportions of 9323 miles to one pint of oil, and 10,043 miles to 1 ounce of bearing, or ¼ of an ounce loss in each bearing per 10,043 miles.

"The bearings and journals are in excellent condition, and the wheels of the carriage have been turned up.

"The above experiment has been most carefully conducted, and the results may be relied on as being perfectly accurate.

"The average mileage of a Railway Carriage is about 22,000 miles per annum ; the above therefore represents about three years' ordinary working.

"ENGINEER'S OFFICE, NINE ELMS WORKS,

"May 12th, 1865."

The saving in engine power obtained by the use of white metal, properly and carefully made, with well-oiled surfaces, can hardly be estimated, but it will be at once seen by the result of this attested trial, made to prove the saving by the use of oil over grease in Railway Carriage bearings, that the saving in power must be very great.

There is also a considerable saving in cost of renewing, as the skeleton of the bearing, which is made of common gun metal, is used over and over again, being re-lined with white metal, and the fittings to the axle box which would be required were new gun-metal bearings used, is altogether saved.

JOHN DEWRANCE AND CO.,

176, GREAT DOVER STREET, LONDON, S.E.

DEWRANCE'S STEAM AND WATER COCK.

MALLINSON'S PATENT.

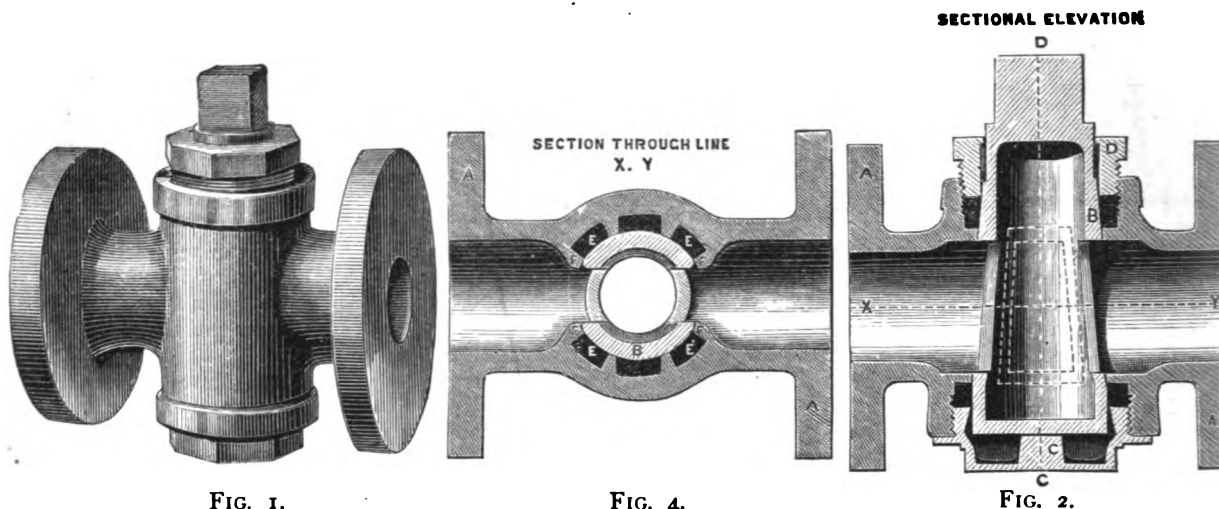


FIG. 1.

FIG. 4.

FIG. 2.

EXPLANATION OF FIGURES.

Fig. 1 is an illustration of Cock complete. Fig. 2 is a Sectional Elevation. Fig. 4 is a Section through line X Y. A is the body or shell of Cock. B is the Plug. C is the bottom Cap. D is the Screw Gland. E E E E are recesses into which is put the Patent Packing. F F F F are projections which are bored to fit the Plug.

The Plug B is kept in its proper position in the shell by the Cap C, which must always be screwed tight to its face. The recesses E E E E are filled with Patent Packing, protected by brass shields, on which alone the Plug B takes its bearing, making it perfectly tight under the highest pressures, while at the same time it works quite smooth and easy.

MESSRS. J. DEWRANCE AND CO. having completed and perfected an invention submitted to them, having for its immediate object the prevention of the irregular and unsatisfactory working of ground Plug Cocks, and of which the other very remarkable advantages are enumerated below, feel themselves now in a position to supply this new system of Plug Cocks to their customers, and to recommend them with confidence, as they have for some time subjected them to the severest tests without failure. They submit as the result of their experience the following remarkable and important advantages obtained by this invention :

- 1st. The Plug is not ground, but is made steam-tight by Patent Packing.
- 2nd. As the Plug works on an Elastic Bearing, it will never wear out.
- 3rd. Should it in time leak, it can be re-packed by any unskilled person without either disconnecting the Cock or taking out the Plug.
- 4th. It presents a clear, full, straight way, equal to the bore of the pipe.
- 5th. It is as serviceable when made of cast iron as of gun metal.
- 6th. It is suitable for the highest pressures of steam or water and gas.
- 7th. It can never set fast, but will always work easy.
- 8th. It cannot be injured by frost.
- 9th. It is cheaper than any other form of Cock or Valve.
- 10th. This principle can be applied to all forms of Plug Cocks or Valves.

This principle is also applied to all kinds of Locomotive and other Boiler Fittings, such as Water Gauges, Warming Cocks, Injector Cocks, Blow-off Cocks, Gauge Cocks, Tender Cocks, Brewers' and Plumbers' Cocks.

JOHN DEWRANCE AND CO.,
176, GREAT DOVER STREET, LONDON, S.E.

MALLINSON'S PATENT.

DEWRANCE'S STEAM COCKS, WITH MALE AND FEMALE OR TWO FEMALE ENDS.

Size	$\frac{1}{2}$ "	$\frac{3}{4}$ "	1"	1 $\frac{1}{4}$ "	1 $\frac{1}{2}$ "	2"
Price, Cast Iron	—	—	9/6	15/0	18/0	26/0
" " with Gun-Metal Plugs	—	—	12/0	16/0	22/0	32/0
" All Gun Metal	6/0	8/6	13/6	18/0	27/6	42/0

If Polished, 20 per cent. extra.

DEWRANCE'S STEAM COCKS, WITH FLANGES.

Size	$\frac{3}{4}$ "	1"	1 $\frac{1}{4}$ "	1 $\frac{1}{2}$ "	2"	2 $\frac{1}{2}$ "	3"	3 $\frac{1}{2}$ "	4"	5"	6"
Price, Cast Iron	—	11/8	17/0	20/0	30/0	40/0	60/0	—	—	—	—
" " Gun-Metal Plugs	—	13/3	21/0	25/0	35/0	60/0	80/0	—	—	—	—
" All Gun Metal	12/0	15/0	27/0	32/0	49/6	80/0	130/0	—	—	—	—

DEWRANCE'S DOWN-WAY BLOW-OFF COCK, WITH FLANGES.

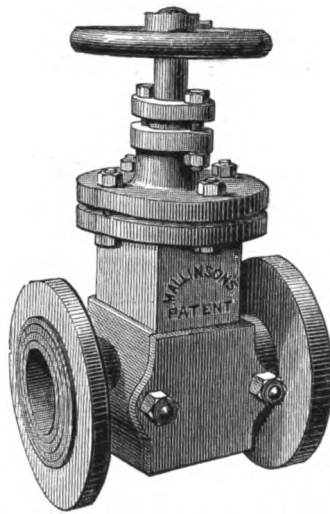
Size	1"	1 $\frac{1}{4}$ "	1 $\frac{1}{2}$ "	2"	2 $\frac{1}{2}$ "	3"	3 $\frac{1}{2}$ "	4"	5"	6"
Price, Cast Iron	12/8	18/0	20/0	30/0	43/0	65/0	—	—	—	—
" " Gun-Metal Plugs	16/0	22/0	25/0	35/0	65/0	82/0	—	—	—	—
" All Gun Metal	18/0	28/0	34/0	51/6	83/0	130/0	—	—	—	—

Prices and Illustrations of every other form of Cock of this principle on application.

DEWRANCE'S
FOR STEAM,

MALLINSON'S

These Valves are made perfectly tight by Patent Packing, protected by Brass Shields, which forms an Elastic Bearing, and against which the faces of the

VALVES
WATER, AND GAS.

PATENT.

Sliding Valve work. They will be found greatly superior to all others, whether for Steam, Water, or Gas.

The important advantages which these Valves possess are as follows :

- 1st. They are not affected by the unequal expansion of Metals, which is so often a cause of leakage, especially in large sizes.
- 2nd. As the working faces are parallel, any accumulation of dirt, &c., is scraped off on its being shut down ; this is an important point as regards Gas Valves.
- 3rd. They are steam-tight on both sides.
- 4th. They can be re-packed (if necessary) at the side doors without being removed from their fixed position.
- 5th. They are cheaper than any other form of Valves.
- 6th. The working parts are made of Gun-metal, therefore will not rust up.

Sizes ..	1 $\frac{1}{2}$ "	2"	2 $\frac{1}{2}$ "	3"	4"	5"	6"	7"	8"	9"	10"	11"	12"
Prices ..	25/0	35/0	43/0	49/0	68/0	83/0	115/0	135/0	170/0	195/0	220/0	250/0	280/0

For Larger Sizes on application.

JOHN DEWRANCE AND CO.,

176, GREAT DOVER STREET, LONDON, S.E.

FIG. 97.



CLASS A.

FIG. 98.



CLASS B.

DAVIS'S PATENT LUBRICATOR,
FOR
CYLINDERS, PISTONS, AND SLIDE VALVES
OF STEAM ENGINES OF ALL KINDS.

MANUFACTURED SOLELY BY
JOHN DEWRANCE AND CO.

This Lubricator is perfectly self acting and extremely simple. It requires no trimming; and the only attention it requires is, when first put on the engine, to see that sufficient oil is drawn past the valve spindle when the steam is off. This can be adjusted most delicately by unscrewing the Lubricator from its connection, and reducing the diameter of the valve spindle by means of a little emery cloth. After it is once adjusted it requires no more attention—ordinarily, not even this is required.

THE OIL IS ONLY ADMITTED TO THE CYLINDERS WHEN THE STEAM IS OFF AND THE ENGINE IN MOTION, THAT BEING THE TIME WHEN IT IS MOST REQUIRED; but the oil so admitted is of course available for lubrication when steam is readmitted, mixing with the steam and lubricating in a most effectual manner cylinder, pistons, and valves.

If the filling valve is carefully closed, no oil can escape when the engine is standing, as it requires a vacuum to be formed behind the valve before the oil can be drawn past the spindle, and to overcome the vacuum in the reservoir above the level of the oil.

ADVANTAGES.

The advantages claimed for this Lubricator are :

- 1st. The greatest simplicity.
- 2nd. Requires no trimming.
- 3rd. Highly economical, as it can be most delicately adjusted to the quantity of oil required to be used.
- 4th. Is most effectual when most wanted.
- 5th. Can be easily taken to pieces and looked at.

PRICES.

- No. 1 Size, for Marine and Stationary Engines of over 100 N.H.P. .. 60s. each.
 No. 2 Size, for Locomotives, to hold half a pint 40s. „

NOTE.—When ordering, please state which Class of Lubricator is required.

Illustrated Sheet, showing methods of fixing, on application.

JOHN DEWRANCE AND CO.,
 176, GREAT DOVER STREET, LONDON, S.E.

PATENT IMPROVED BOURDON STEAM, HYDRAULIC, AND VACUUM GAUGES.



FIG. 5.



FIG. 4.

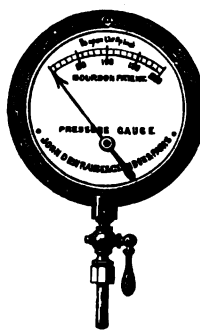


FIG. 3.

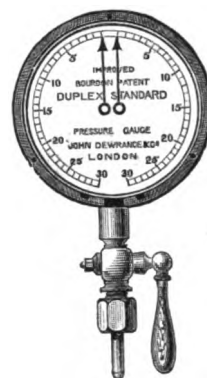


FIG. 6.

JOHN DEWRANCE AND CO., in offering their revised Price List of Steam Gauges, &c., &c., to their customers, would beg to refer them to the reputation these Gauges have made for their capability of sustained sensitiveness and accuracy, as well as for their good solid work and finish.

Every care has been taken to correct and remedy any defect or weak point in the Bourdon Gauge, and Messrs. JOHN DEWRANCE AND CO. can, after twenty-four years' experience in the sale of these Gauges, confidently recommend them.

The special qualities claimed for these Gauges are :

- 1st. Their accuracy.
- 2nd. They are not affected by frost.
- 3rd. Freedom from injurious vibration.
- 4th. Extreme simplicity.
- 5th. All the working parts are fastened to one bed plate, so that the Gauge is complete in itself, without being dependent upon the case for fixing. See Fig. 4.

These specialities have been secured under a Patent. Each Gauge is tested with a Column of Mercury, and is marked from the Mercury Column on its own dial, so as to ensure the greatest accuracy.

Every Gauge sent out from the Manufactory is guaranteed for two years ; if they fail within that time they will be put right without expense.

A large quantity of all kinds of Gauges kept in stock.

Orders can be executed at a day's notice.

Estimates given for keeping Gauges in proper order at a rate per annum.

Repairs of all kinds of Gauges.

Special Estimates for large quantities as usual.

FIG. 5. STEAM-PRESSURE GAUGE, in Polished Brass Case, with Central Hands.

Diameter	7"	6"	5"	4"	3"
Price	40/0	37/6	32/6	25/0	22/6

FIG. 3. STEAM-PRESSURE GAUGE, in Polished Brass Case, with Eccentric Hands.

Diameter	7"	6"	5"
Price	40/0	37/6	32/6

FIG. 6. DUPLEX STANDARD PRESSURE GAUGE, adopted as the Standard Testing Gauge by the Board of Trade (Marine Department) of the British Government.

Diameter	7"	6"
Price	60/0	57/6

Iron-Pipe Syphons, 1/6 each.

Connections for ditto, 1/0.

Gun-Metal Cocks, 3/6.

NOTE.—Fig. 4 shows J. D. and Co.'s anti-frost arrangement, with Tube half-way round ; this makes quite as good a Gauge as an all-round Tube, with the advantage of not allowing the water to remain in Tube.

The all-round Tube can be supplied at same prices by customers stating in their orders "all-round Tube."

JOHN DEWRANCE AND CO.,

176, GREAT DOVER STREET, LONDON, S.E.

IMPROVED GIFFARD INJECTORS.

MANUFACTURED BY J. DEWRANCE AND CO.

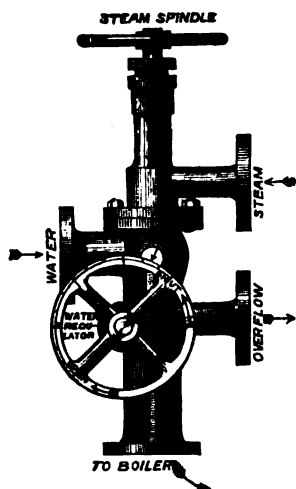


FIG. 29.

These Injectors possess many advantages over the ordinary Giffard Injector, both in construction and manipulation. Injectors, as boiler feeders, are greatly superior to any pump for the following reasons:

1st. The first cost is far less than any pump in the market.

2nd. They are entirely separate from the engine, being an adjunct to the boiler.

3rd. The steam used by the Injector is returned to the boiler with the feed water, thereby raising the temperature.

4th. This prevents the unequal expansion, so disastrous to boiler plates, caused by pumping in water at a low temperature.

5th. The feed water enters the boiler in a continuous stream, instead of the intermittent action caused by all pumps, and which action, particularly in high pressure, so soon destroys both valves and seatings.

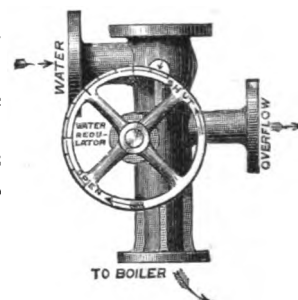


FIG. 30.

Fig. 29 illustrates an Injector arranged for lifting its supply water, as well as forcing water into a boiler, having an adjustment for the steam and also the water supply, the index for the latter being graduated in accordance with the pressure gauge.

Fig. 30 illustrates an Injector for forcing water only, the supply water in this case being above or on a level with the Injector. It has a water adjustment only, and is arranged to accommodate itself to any variation of pressure in the boiler to which it is attached.

Either of the foregoing class of Injectors is suitable for stationary, locomotive, or marine boilers, and will work with the supply water at a temperature of 130° Fahr.

Many thousands of those Improved Injectors are already in use.

GENERAL INSTRUCTIONS FOR WORKING THESE INJECTORS.

1st. Open the valves or cocks connecting the Injector with the boiler.

2nd. Open the water supply by means of the graduated hand-wheel, to the extent required for the steam pressure in the boiler.

3rd. Open the steam spindle (Fig. 29) or valve on steam pipe (Fig. 30) slightly, until water issues freely from the overflow pipe, then open up the steam spindle, or steam-valve cock to the full extent. If water continues to issue from the overflow pipe, regulate the water supply by means of the graduated hand-wheel.

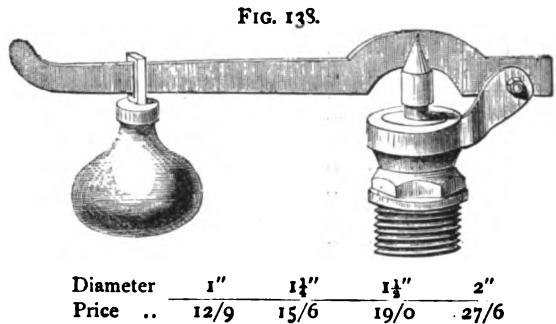
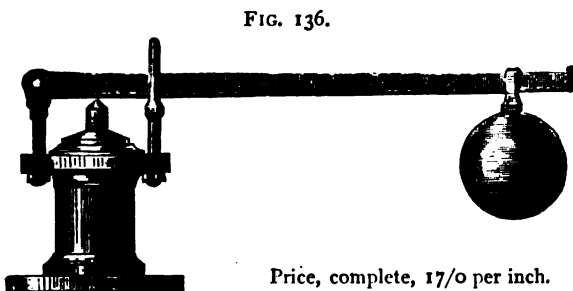
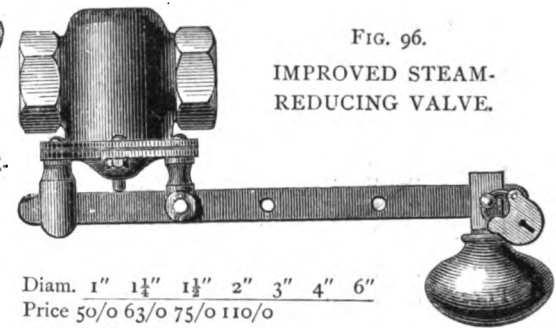
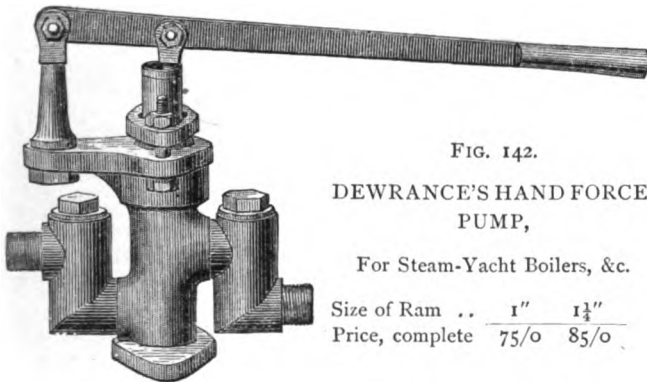
4th. The nut at the back of the water-regulating wheel must be kept moderately tight (a suitable spanner for which is supplied), to prevent the possibility of the wheel being accidentally moved from its proper position.

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TABLE GIVING THE PRICE, SIZE, AND HORSE-POWER OF GIFFARD INJECTORS.

Size of Injector in Millimetres.	Internal diameter of Pipes in inches.	Fig. 29, entirely of Brass.	Fig. 29, with Brass Spindle, Nozzles, and Cast- Iron Case.	Fig. 30, entirely of Brass.	Fig. 30, with Brass Nozzles and Cast-Iron Case.	10 lb.	20 lb.	30 lb.	40 lb.	50 lb.	60 lb.	70 lb.	80 lb.	90 lb.	100 lb.	110 lb.	120 lb.	130 lb.	140 lb.	150 lb.
No.		£ s.	£ s.	£ s.	£ s.	NOMINAL HORSE-POWER AT THE ABOVE PRESSURES.														
2	1	3 15	..	2 15	..	2	3	4	5	5	6	6	7	7	8	8	8	9	9	9
3	1	4 0	..	3 0	..	5	7	9	11	12	14	15	16	17	18	18	19	20	21	21
4	1	5 15	4 10	3 18	3 5	10	14	17	20	22	24	26	28	30	31	33	34	36	37	39
5	1	6 5	4 15	4 10	3 10	15	22	27	31	35	38	41	44	47	49	52	54	56	58	60
6	1 1/4	8 15	6 10	6 0	4 5	22	32	39	45	50	55	59	64	67	71	75	78	81	84	87
7	1 1/2	9 5	7 10	6 15	4 10	34	43	53	61	68	75	82	87	92	97	102	106	111	115	119
8	1 3/4	12 0	8 15	8 5	6 0	40	56	69	80	89	98	106	113	120	127	133	139	145	150	155
9	1 3/4	13 0	9 15	9 5	7 0	50	72	88	101	113	124	134	144	152	161	168	176	183	190	197
10	2	15 0	11 15	10 10	8 5	62	88	108	125	152	154	166	177	193	195	208	217	229	235	243
11	2	16 0	12 15	11 10	9 5	76	107	131	152	170	186	201	215	228	240	252	263	274	284	294
12	2 1/4	19 0	13 15	12 15	10 10	90	128	156	183	206	221	239	256	271	286	300	313	326	338	350



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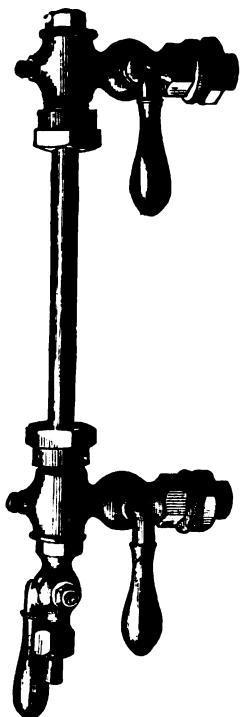


FIG. 42.

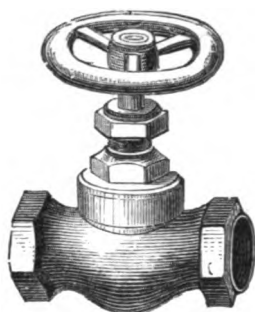


FIG. 57.

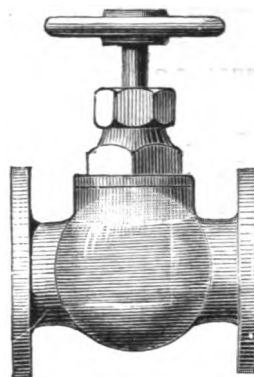


FIG. 56.



FIG. 49.

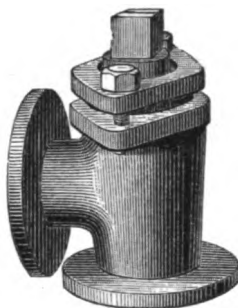


FIG. 62.

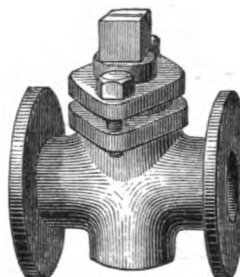


FIG. 67.

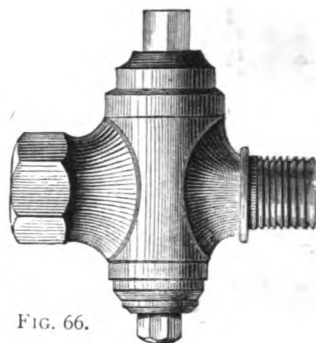


FIG. 66.

PRICES.

FIG. 42. STRONG GUN-METAL WATER GAUGE, ROUND BODY, EBONY OR METAL HANDLES.

Size	1"	1 1/2"	2"	2 1/2"	3"
Price	23/6	26/6	32/0	34/0	

FIG. 57. STRONG GUN-METAL STOP VALVE, ENDS SCREWED TO IRON PIPE, LEATHER OR METAL VALVES, AS ORDERED.

Size	1/2"	3/4"	1"	1 1/2"	1 3/4"	2"
Price	5/3	7/6	10/8	13/9	17/3	29/6

Best quality.

FIG. 56. STRONG GUN-METAL STOP VALVE, WITH FLANGES.

Size	1"	1 1/2"	2"	2 1/2"	3"
Price	17/0	24/0	36/0	41/6	60/6

SAME PATTERN, WITH ONE SCREWED END AND ONE FLANGE, SAME PRICES.

THE SAME PATTERN IN CAST IRON, WITH GUN-METAL VALVE, SEAT, SPINDLE, AND NUT.

Size	2"	2 1/2"	3"	3 1/2"	4"	5"	6"	8"	9"	10"	12"
Price	30/0	38/0	46/0	57/6	77/6	92/6	110/0	160/0	190/0	244/0	320/0
Diam. of Flanges ..	6 1/2"	7"	7 1/2"	8"	9"	10"	12"	14"	15 1/2"	17"	19"
Length over ditto ..	8"	9"	10"	11"	12"	14"	17"	18 1/2"	20"	22"	25"

FIG. 49. GUN-METAL STEAM WHISTLE, EBONY OR METAL HANDLES.

Diam.	1 1/2"	1 3/4"	2"	2 1/2"	3"	3 1/2"	4"	5"	6"
Price	8/9	10/6	11/6	14/0	16/6	18/0	30/0	35/0	65/0

FIG. 62. STRONG GUN-METAL DOWN-WAY GLAND BLOW-OFF COCK, WITH FLANGES.

Size	1"	1 1/2"	2"	2 1/2"	3"
Price	18/0	26/0	33/0	53/0	78/0

FIG. 67. GUN-METAL GLAND STEAM COCK, WITH FLANGES.

Size	1"	1 1/2"	2"	2 1/2"	3"	3 1/2"
Price	14/0	23/0	30/9	49/0	72/0	120/0

FIG. 66. GUN-METAL STEAM COCK, LONDON PATTERN.

Size	1/2"	3/4"	1"	1 1/2"	1 3/4"	2"
Price	3/0	3/6	4/0	6/0	9/6	16/6
Rough Polished ..	3/6	4/0	5/0	7/3	11/0	18/6

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FIG. 94.



FIG. 95.

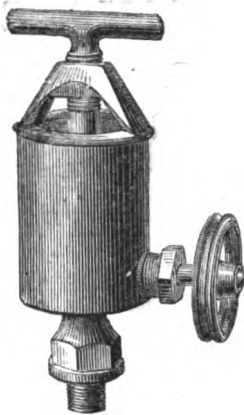


FIG. 100.

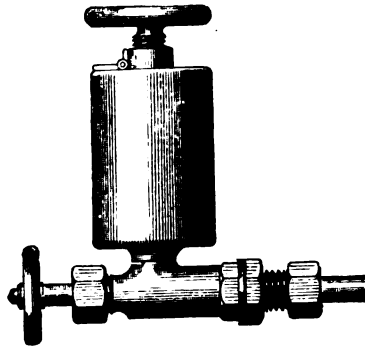


FIG. 102.

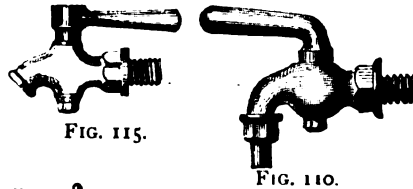


FIG. 115.

FIG. 110.

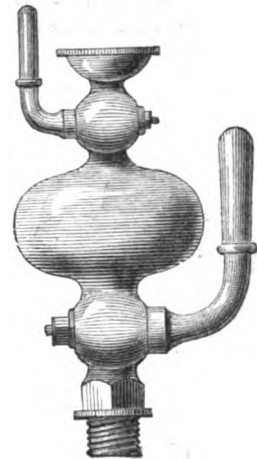


FIG. 104.

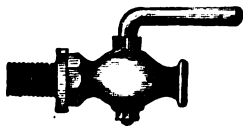


FIG. 109.

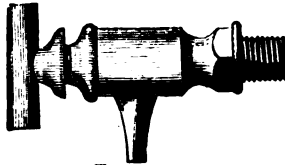


FIG. 114.

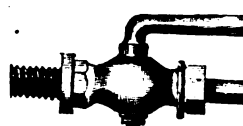


FIG. 116.



FIG. 118.

FIG. 94. GUN-METAL GREASE COCK.

Size ..	2"	3"
Price ..	10/0	13/3

FIG. 95. CYLINDER GREASE COCK.

Size, screwed to 1" pipe ..	17/6
" " 1/2" " ..	11/6

This is also made without Nose at bottom.

FIG. 100. J. DEWRANCE AND CO.'S IMPROVED DOUBLE VALVE LUBRICATOR.

This pattern is strongly recommended as a substitute for the ordinary Double Tallow Cock, which is so frequently a source of trouble and annoyance to Engineers through leakage.

Size, to hold 1 pint, screwed to 1" pipe, 30/0. To hold 1/2 pint, screwed to 3/4" pipe, 23/6.

FIG. 102. DOUBLE VALVE LUBRICATOR, WITH ELBOW.

To hold 1 pint, 34/0. To hold 1/2 pint, 27/6.

FIG. 104. GUN-METAL DOUBLE TALLOW COCK.

Size ..	1 1/2"	1 3/4"	2"	2 1/2"	3"	3 1/2"	4"
Price ..	9/3	10/0	11/9	14/0	19/6	23/6	26/0

FIG. 109. GUN-METAL PET COCK.

Size ..	1/4"	3/8"	1/2"	5/8"	3/4"
Price ..	2/6	3/0	4/0	—	—

FIG. 110. GUN-METAL COCK, WITH UNION JOINT.

Price ..	—	5/9	6/6	—	—
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FIG. 114. GUN-METAL SCREW VALVE GAUGE COCK.

Price ..	—	—	7/0	—	8/6
----------	---	---	-----	---	-----

FIG. 115. GUN-METAL PET COCK:

Price ..	2/9	3/6	4/6	5/9	7/0
----------	-----	-----	-----	-----	-----

FIG. 116. GUN-METAL PET COCK, WITH UNION.

Price ..	4/6	5/0	5/9	—	8/6
----------	-----	-----	-----	---	-----

FIG. 118. GUN-METAL PET COCK, WITH CLEANING SCREW.

Price ..	—	—	5/0	—	8/0
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JOHN DEWRANCE AND CO.,

176, GREAT DOVER STREET, LONDON, S.E.

WATER METERS.

FIG. 157.

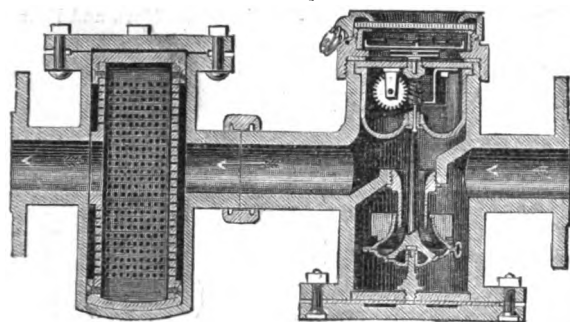


Fig. 157 is a Section of Water Meter and Dirt Box, showing all working parts.

FIG. 158.

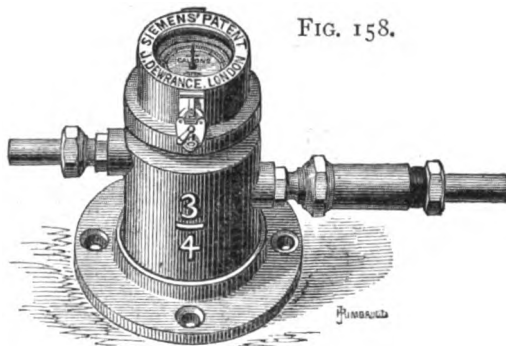


Fig. 158 is a Front Elevation of Water Meter and Brass Filter, screwed for iron pipe or tinned for lead pipe.

J. DEWRANCE AND CO. have made a speciality of these Meters, and in order to ensure their perfect accuracy and working have taken every precaution that all Meters shall be accurately tested before leaving the Works. Every Meter is numbered, and the date and results of the test filed for future reference.

Any Meter varying more than 1 per cent. from the standard measure is adjusted.

All Meters are guaranteed to be not more than 5 per cent. between their maximum and minimum measurements. A record is kept of the final tests of all Meters, copies of which can be had on application.

J. D. and Co. also undertake to keep in permanent repair or renew their Meters at the rate of 5 per cent. per annum upon the first cost, which is generally found to be in excess of the price paid for repairs as they occur.

TABLE OF PRICES.

Numbers.	Gallons delivered per hour, at an effective pressure of 50 feet.	Gallons delivered per hour at an effective pressure of 150 feet.	Diameter of inlet and outlet.	Prices each with brass filters and unions tinned for lead pipes.	Price each with flanged ends for connecting to iron pipe, and with dirt box attached, fitted with copper strainer.	Price each without dirt boxes (but we strongly recommend the Meters to be always used with dirt boxes, they last longer and work better).	Extras—if ordered.			
							Dial Protector.	Street Meter Case.	Spigot and Socket.	Annual guarantee charge to keep Meters in order.
				£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1	150	250	1 1/2 inch	2 18 0	..	..	0 2 0	1 6 0	..	0 4 0
2	300	500	2 inch	3 8 0	..	..	0 2 0	1 6 0	..	0 5 4
3	600	1,000	2 1/2 inch	4 8 0	..	..	0 2 0	1 6 0	..	0 6 8
4	1,500	2,500	3 inch	5 3 0	5 14 0	5 3 0	0 3 4	1 6 0	0 7 6	0 8 0
5	2,200	3,800	3 1/2 inch	6 10 0	7 3 0	6 10 0	0 3 4	1 6 0	0 7 6	0 10 8
6	3,000	5,000	4 inch	7 14 0	8 9 0	7 14 0	0 3 4	1 6 0	0 7 6	0 12 0
7	4,000	7,000	4 1/2 inch	..	10 16 0	9 6 0	0 4 0	1 18 0	0 9 0	0 16 0
7 1/2	6,000	10,000	5 inch	..	13 9 0	11 14 0	0 4 0	1 18 0	0 11 0	1 0 0
8	8,300	14,000	5 1/2 inch	..	16 0 0	14 0 0	0 4 0	1 18 0	0 13 0	1 4 0
9	13,400	20,000	6 inch	..	21 7 0	18 14 0	0 4 0	1 18 0	0 16 0	1 10 8
10	18,500	32,000	6 1/2 inch	..	26 6 0	23 8 0	0 4 0	2 16 0	1 0 0	2 0 0
11	27,000	46,000	7 inch	..	32 4 0	28 0 0	0 6 8	2 16 0	1 4 0	2 7 0
12	45,000	77,000	8 inch	..	49 10 0	42 0 0	0 6 8	4 0 0	1 10 0	3 7 0
13	70,000	120,000	10 inch	..	66 0 0	56 0 0	0 6 8	..	2 10 0	4 10 0
14	90,000	154,000	12 inch	..	87 13 0	74 13 0	0 6 8	..	3 5 0	6 0 0

Damage having been done to Meters by concussion, in consequence of cocks being used which can be shut off instantly, we strongly recommend that none but Screw Valves be used from the Meter, of which a variety can be seen on illustrated sheet.

To prevent damage to Meters in stock, always keep them above freezing point.

Full instructions for fixing sent on application.

Meters made with Foreign Divisions of Measurement.

JOHN DEWRANCE AND CO.,

176, GREAT DOVER STREET, LONDON, S.E.

IMPROVED DOUBLE-FACED SLUICE VALVES,

WITH FLANGED OR SOCKET ENDS.

These Valves are made on the most approved principle, and are fitted with strong Gun-Metal Screws, Nuts, and Four Valve Faces, and tested with a pressure of 200 lb. on the square inch before leaving the Works.

PRICES.

Gun-Metal Screws, Nuts, and, Four Valve Faces					Wrought-Iron Screws, Gun-Metal Nuts, and Two Valve Faces.				
1½ inch	..	..	£1	17 6	1½ inch	..	..	£1	15 0
2	..	..	2	13 6	2	..	..	2	7 6
2½	..	..	3	2 6	2½	..	..	2	15 0
3	..	..	3	9 0	3	..	..	3	3 0
4	..	..	4	17 6	4	..	..	4	5 0
5	..	..	6	5 0	5	..	..	5	7 6
6	..	..	7	12 6	6	..	..	6	12 6
8	..	..	10	0 0	8	..	..	8	10 0
10	..	..	12	5 0	10	..	..	10	10 0
12	..	..	16	0 0	12	..	..	14	0 0

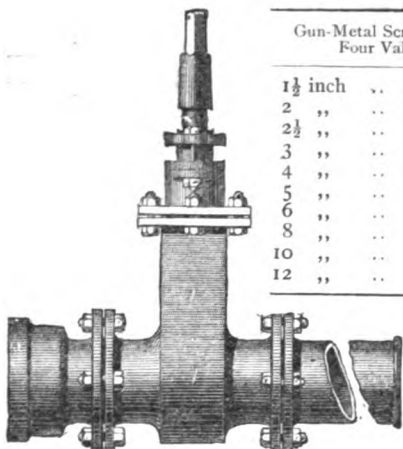


FIG. 160.

Fig. 161, with Socket Ends, same Price as Fig. 160.

Spigot and Socket Ends for Bolting to Flanges, Fig. 160.

2" 2½" 3" 4" 5" 6"

Price, 9s. 11s. 13s. 16s. 20s. 24s. per pair.

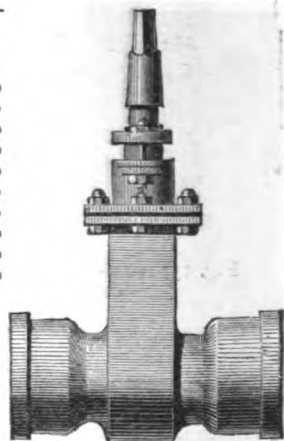


FIG. 161.

FIG. 162.

IMPROVED STAND-PIPE
FOR BALL HYDRANTS,

With Copper Pipe, Gun-Metal Single-Swivel Elbow, Hose Union, Bayonet Joint, Valve Rod, and Screw.

Price, 2 in. 80s.; 2½ in. 90s.

Extra length, per foot, 5s.

The same, with Double-Swivel Elbow, 2 in. 90s.; 2½ in. 100s.



FIG. 162.

FIG. 163.

CAST-IRON BALL HYDRANT,
With Rubber Ball.

Price, 2 in. 16s.; 2½ in. 20s.

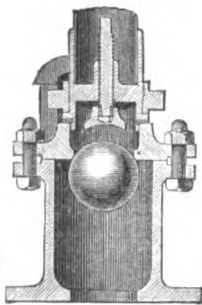


FIG. 163.

FIG. 167.

HIGH-PRESSURE
HYDRANT,

With Gun-Metal Working Parts.

Price, with Cover for Footway,

1½ in. 25s.; 2 in. 30s.;
2½ in. 36s.

Without Cover,

1½ in. 18s.;
2 in. 22s. 6d.;
2½ in. 26s.

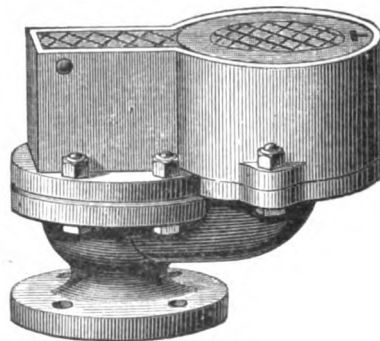


FIG. 167.

FIG. 165. COPPER STAND-PIPE,
With Single-Swivel Elbow and Screw Cap,
complete.

Price, 2 in. 60s.; 2½ in. 67s. 6d.

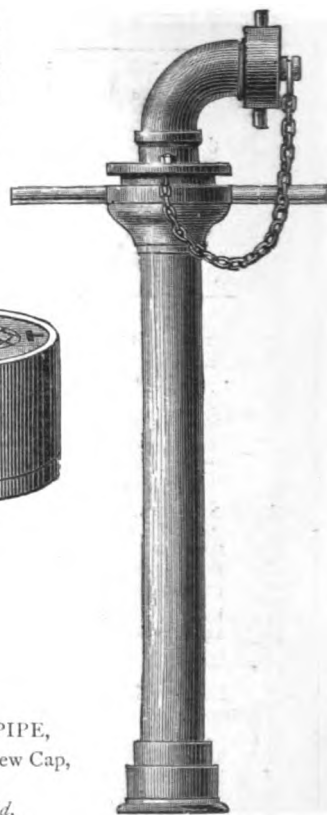


FIG. 165.

JOHN DEWRANCE AND CO.,
176, GREAT DOVER STREET, LONDON. S.E.



FIG. 170.



FIG. 168.

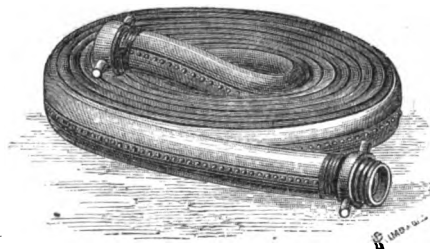


FIG. 173.

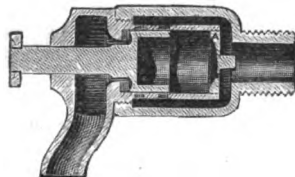


FIG. 185.

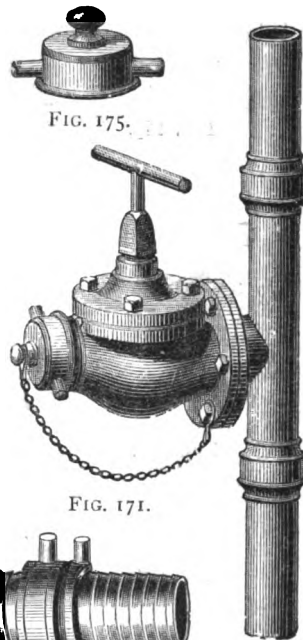


FIG. 171.



FIG. 178.

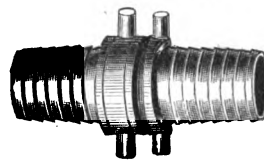


FIG. 174.

FIG. 170. CAST-IRON WATER POST, WITH IMPROVED SELF-CLOSING VALVE.

Price, complete, 120/0; without Self-Closing Valve, 105/0.

FIG. 168. COPPER BRANCH PIPE, WITH GUN-METAL CONNECTIONS.

Size (Hose Pipe)	1½"	1¾"	2"	2½"	3"
Price, Long	17/6	21/0	22/0	23/0	28/0
„ Short	14/6	16/0	18/0	20/6	23/0

FIG. 173. LEATHER DELIVERY HOSE PIPE, COPPER RIVETTED.

Size	1½"	1¾"	2"	2½"	3"	3½"	4"	5"	6"
Price, per foot	2/5	2/7	3/0	3/3	3/6	3/9	4/3	4/9	5/5

FIG. 185. J. DEWRANCE AND CO.'S IMPROVED SELF-CLOSING VALVE.

This Valve is made upon an entirely new principle, and effectually prevents the usual concussion so damaging to the pipes.
Price, ½", 5/9; ¾", 8/0.

FIG. 178. EQUILIBRIUM BALL-VALVE, WITH COPPER BALL, complete.

Size	¾"	1"	1½"	2"	2½"	3"	4"
Price, Plain Shank ..	2/9	3/3	4/4	8/6	13/6	20/0	40/0
„ Screwed for Iron ..	3/0	3/6	4/8	9/3	14/6	21/6	43/6
„ Screw Boss	3/3	3/9	5/2	10/0	15/6	23/0	47/0

FIG. 174. GUN-METAL UNION JOINT FOR HOSE PIPES.

Size (inside diameter) ..	1½"	1¾"	2"	2½"	3"	3½"	4"
Price, Strong	5/6	6/9	8/0	9/6	11/6	14/0	25/0
„ Light	5/0	6/3	7/3	8/6	10/6	12/9	21/0

The 2½" is screwed to the London Fire Brigade Gauge.

FIG. 171. CAST-IRON FIRE VALVE, FITTED WITH RUBBER DIAPHRAGM AND GUN-METAL WORKING PARTS.

Price, 2", 29/0; 2½", 32/6. T Spanners, 5/0.

FIG. 175. BLANK CAPS FOR HOSE UNION.

Size	1½"	1¾"	2"	2½"	3"
Price	2/6	3/0	3/9	4/4	5/0

JOHN DEWRANCE AND CO.,
176, GREAT DOVER STREET, LONDON, S.E.

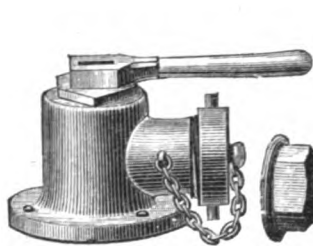


FIG. 169.

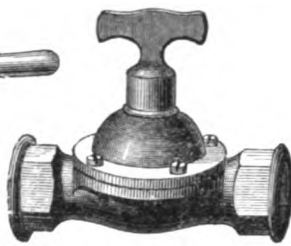


FIG. 186.



FIG. 187.

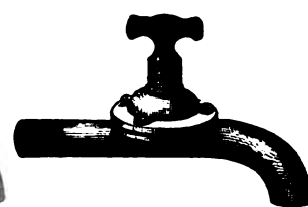


FIG. 188.

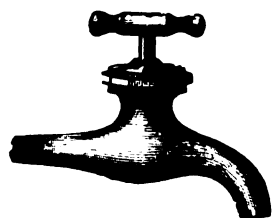


FIG. 191.

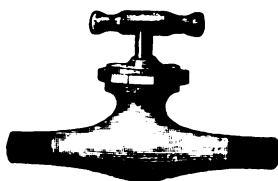


FIG. 192.



FIG. 189.

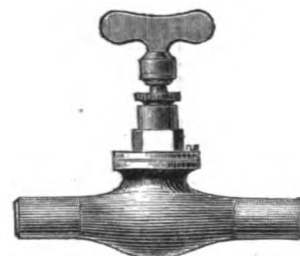


FIG. 190.

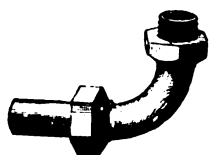


FIG. 179.



FIG. 180.

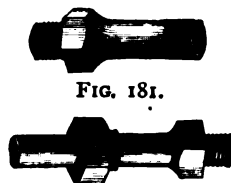


FIG. 181.



FIG. 182.



FIG. 183.



FIG. 184.

FIG. 169. GUN-METAL FIRE COCK, GOVERNMENT PATTERN, WITH LEVER, CAP, AND CHAIN.

Size	2"	2½"
Price	55/6	82/6

FIG. 186. STRONG HIGH-PRESSURE DIAPHRAGM VALVE, SCREWED FOR IRON PIPE.

Size	½"	¾"	1"	1½"	1¾"	2"
Price (Male ends if required) ..	4/9	6/6	11/0	18/6	25/0	32/0

FIGS. 187 AND 188. HIGH-PRESSURE DIAPHRAGM VALVES.

Size	¾"	1"	1½"	2"
Price (Screw Boss Bib)	3/0	3/6	5/3	8/3
„ (Screw Shank Bib)	2/9	3/3	4/9	7/9
„ (Plain Shank Bib)	2/6	3/0	4/6	6/9

FIG. 189. HIGH-PRESSURE BIB VALVE.

Size	¾"	1"	1½"	2"
Plain Shank (Polished) ..	2/2	2/10	4/6	7/0
Screwed „ ..	2/4	3/2	4/11	7/6
Screw Boss ..	2/9	3/5	5/6	8/5
Plain Shank (Rough) ..	1/11	2/6	4/0	6/4
Screwed „ ..	2/1	2/10	4/5	6/10
Screw Boss ..	2/6	3/1	5/0	7/9

FIG. 190. HIGH-PRESSURE STOP VALVE.

Size	¾"	1"	1½"	2"
Plain Shank (Polished) ..	2/2	2/10	4/6	7/0
Screwed one end	2/5	3/2	5/0	7/8
„ both ends	2/8	3/5	5/4	8/2
Plain Shank (Rough) ..	1/11	2/6	4/0	6/4
Screwed one end	2/2	2/10	4/6	7/0
Screwed both ends	2/5	3/1	4/10	7/6

FIG. 191.

Plain Shank (Polished) ..	2/10	3/4	4/8	8/2
Screwed „ ..	3/2	3/8	5/3	9/0
Screw Boss ..	3/4	4/0	5/10	10/0
Plain Shank (Rough) ..	2/10	3/2	4/7	8/2
Screwed „ ..	3/0	3/4	4/9	8/4
Screw Boss ..	3/2	4/3	5/8	9/5

FIG. 192.

Plain Shank (Polished) ..	2/10	3/4	4/8	8/2
Screw „ ..	3/2	3/8	5/3	9/0
Plain „ (Rough) ..	2/8	3/2	4/7	8/2
Screwed ends ..	3/0	3/4	4/9	8/4

FIG. 183. STRONG UNION JOINTS FOR LEAD PIPES.

Size	¾"	1"	1½"	2"
Price	1/1	1/4	2/1	2/7

FIG. 184. (Screwed to Iron Pipe.)

Size	¾"	1"	1½"	2"
Price	1/6	1/10	2/3	3/0

JOHN DEWRANCE AND CO.,

176, GREAT DOVER STREET, LONDON, S.E.

BULL'S PATENT HAND DREDGER.

EXTENSIVELY USED BY THE INDIAN GOVERNMENT.

PRICES.

SUITABLE FOR DREDGING.

To hold $2\frac{1}{2}$ cubic feet	£	s.
" 4 "	12	12
" 6 "	15	15
" 12 "	17	17

Special Estimates for Larger Sizes.

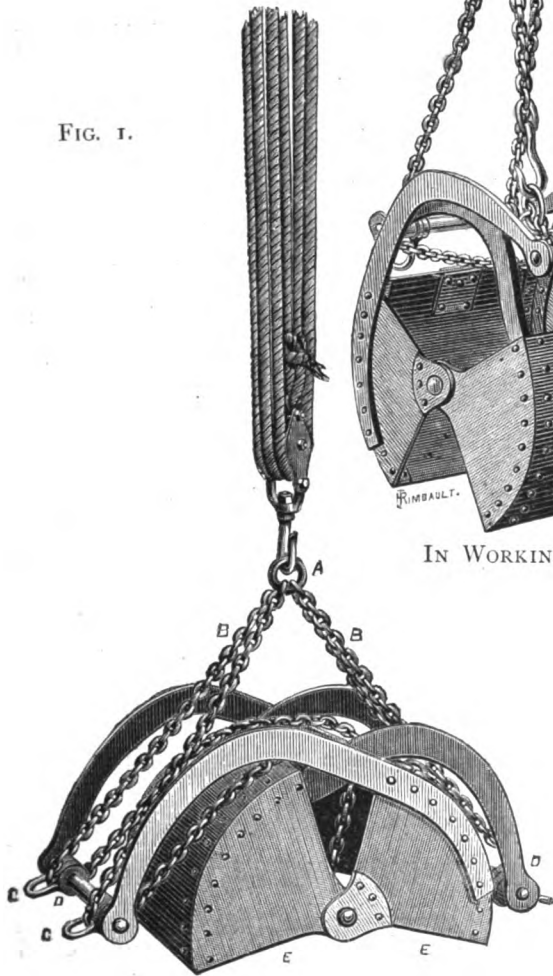
FIG. 2.

PRICES.

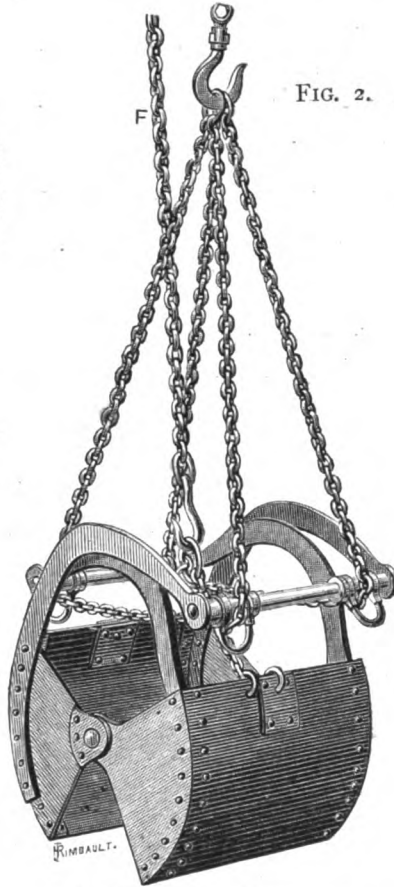
SUITABLE FOR UNLOADING GRAIN, &c.

To hold 2 bushels ..	£	s.
" 4 "	12	0
" 8 "	15	0
" 12 "	17	1
" 12 "	22	10

FIG. 1.



IN POSITION TO BE LOWERED.



IN WORKING POSITION.

FIG. 3.



POSITION AFTER COMPLETING ITS OPERATION, AND FULL OF EXCAVATED MATERIAL.

SOLE MANUFACTURERS AND AGENTS:

JOHN DEWRANCE AND CO.,

176, GREAT DOVER STREET, LONDON, S.E.

BULL'S PATENT HAND DREDGER.

The advantages of the "Dredger" are:

- 1st. The principle upon which it works is so simple, that any ordinary labourer can use it with very little practice, while a sand pump requires an engineer.
- 2nd. Its construction is so plain that it cannot easily get out of order.
- 3rd. It is quickly rigged up or taken down, a quarter of an hour being ample time for either purpose.
- 4th. It is admirably adapted for dock clearing and for the removal of mud or sand wherever it accumulates at rivers' mouths; also for unloading grain from the holds of ships, filling granaries, &c.
- 5th. It can be worked at any reasonable depth.
- 6th. It works cheaper and more expeditiously than the sand pump.

The Dredger has been at work for some time in India, and has almost entirely superseded the sand pump, and its utility can be seen from the following extract from the Report of Guildford L. Molesworth, Esq., Consulting Engineer to the Government of India for State Railways; also published in the Supplement to the 'Gazette of India,' September 16th, 1872, as follows: "On the Ravee and Chenab the well sinking has been very successful, a large number of piers having been sunk 60 and 70 feet below low-water level during past cold season. The wells have been sunk chiefly by the use of 'Bull's Dredger,' which appears to have superseded the sand pump."

George Woodbridge, Esq., M.I.C.E., Officiating Engineer of the Oude and Rohilkund Railway, Lucknow, in 'Professional Papers on Indian Engineering,' No. 26, shows the comparative work done by one of "Bull's Dredgers" and a sand pump:

"The average of sinking by the Dredger of 14½ days' work was 1·27 feet per day for a 14-feet diameter well, between the depths of 23 feet and 42 feet below water level."

The average by a sand pump, worked by a crab, was only ·70 of a foot; and further as to the comparative cost of the two machines, the results are:

	s.	d.
"Bull's Dredger" cost per foot sinking in India	7	7
A 2-feet Sand Pump	13	5½

thus showing a very large reduction in the cost per foot, equal to 43½ per cent., besides an increased rate of progress.

JOHN DEWRANCE AND CO.,

176, GREAT DOVER STREET, LONDON, S.E.

DOWNTON'S PATENT SHIP'S PUMP.

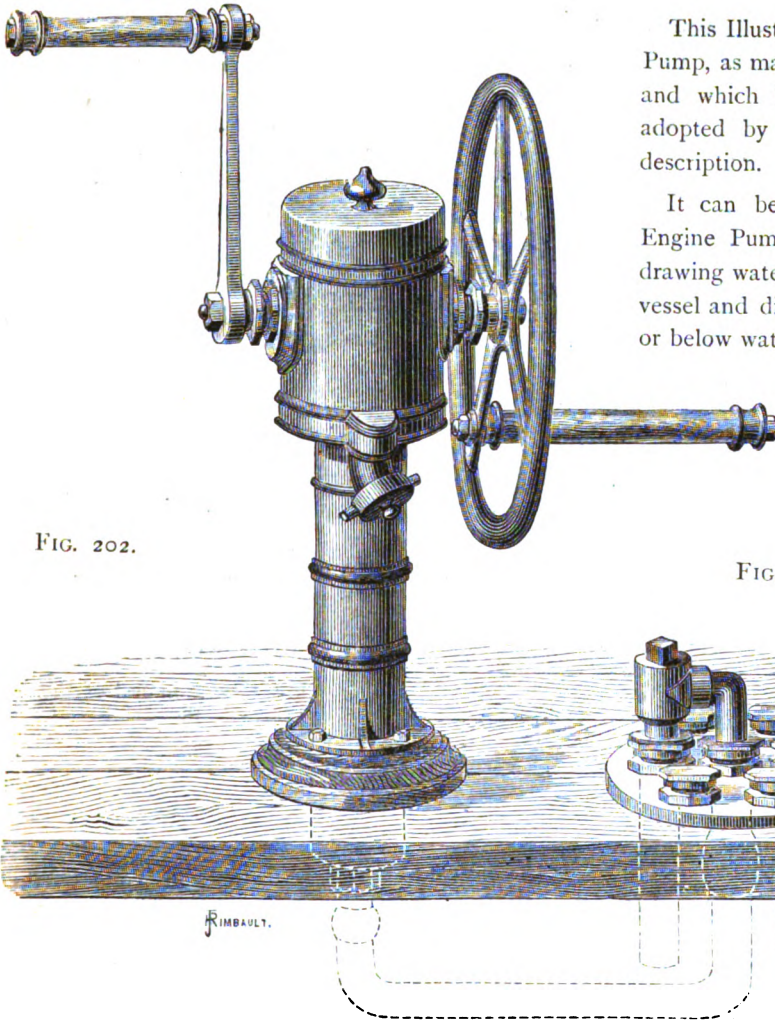


FIG. 202.

FIG. 2C2A.

This Illustration represents a Downton Pump, as manufactured by J. D. and Co., and which has been more extensively adopted by shipowners than any other description.

It can be used as a Bilge and Fire Engine Pump; also for washing decks, drawing water from different parts of the vessel and discharging same, either above or below water line.

This pump is very ornamental in appearance, and occupies no more space, although equal in power to three ordinary pumps, it having three distinct buckets working in one barrel, and upon repeated trials has proved far superior to all others.

Estimates given for fixing.

DESCRIPTION: *Polished Gun-Metal Barrel, Head, Cap, Stuffing Boxes, Discharge Nozzle and Buckets, Wrought-Iron Three-Throw Crank and Bucket Rods, Cast-Iron Fly Wheel, Polished Elm Handles and Tail Pipe.*

Size, inside diameter of Barrel	4½"	5"	6"	7"	8"
Price	450/0	530/0	710/0	800/0	—

For larger sizes up to 12 inches diameter, prices on application.

If fitted with valve box in bottom of barrel to draw from one place only, extra :

Size	4½"	5"	6"	7"	8"
Price	34/0	34/0	41/0	48/6	—

JOHN DEWRANCE AND CO.,

176, GREAT DOVER STREET, LONDON, S.E.

DOWNTON'S PUMP FITTINGS.

FIG. 202A.—GUN-METAL DECK PLATE,

With goose neck (in which is fitted the suction valve of pump) and connections to draw from SIX different places in the vessel.

Size for diameter of pump ..	4½"	5"	6"	7"	8"
Price	118/0	190/0	190/0	190/0	—
Gun-Metal Deck Plates as foregoing to draw from THREE different places in the vessel.					
Size	4½"	5"	6"	7"	8"
Price	95/0	135/0	135/0	135/0	—

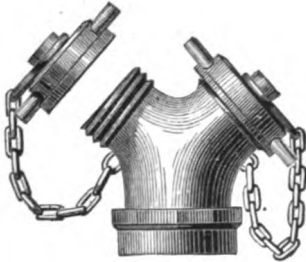


FIG. B.

GUN-METAL BREECH PIECE,
For connecting two Hose
Pipes in case of fire, &c.
Price 25/6.

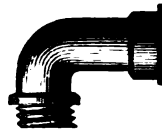


FIG. C.

GUN-METAL ELBOW,
For Engine Branch Pipe.
Price 4/6.



FIG. E. TANK PIPE AND ELBOW. Price 16/0.



FIG. D.

GUN-METAL CUP SCREW,
To be screwed down on upper
deck when pump is fixed below.
Price 11/0.



FIG. G.

GUN-METAL SPREADER,
To be screwed on end of Branch
Pipe.
Price 3/6.

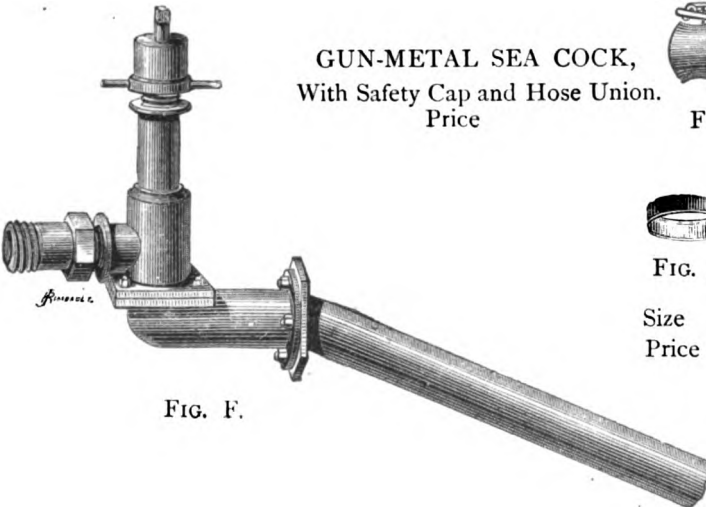


FIG. F.

GUN-METAL SEA COCK,
With Safety Cap and Hose Union.
Price

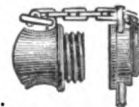


FIG. H.

**GUN-METAL BRANCH
SCREW AND CAP,**
For attaching Hose Pipe
to Delivery Main between
decks.
Price 5/0.



FIG. J.

CAP LEATHERS,
FOR PUMP BUCKETS.

Size	4½"	5"	6"	7"	8"
Price	2/3	2/10	3/8	4/10	—

JOHN DEWRANCE AND CO.,

176, GREAT DOVER STREET, LONDON, S.E.

DOWNTON'S PUMP FITTINGS.

CAST-IRON BILGE STRAINER,
To which is bolted the Bilge Suction Pipe.
Price according to size and shape.

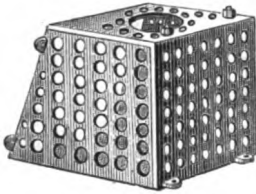


FIG. 202 K.

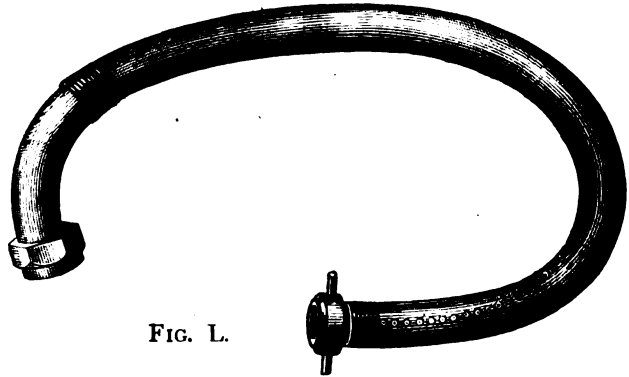
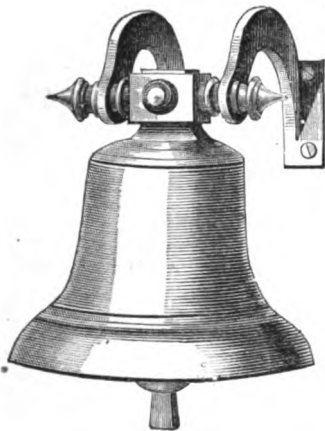


FIG. L.

COPPER RIVETTED DALE HOSE.

This hose pipe is used for a variety of purposes—it is the discharge pipe from the pump through which water can be delivered either above the water line or below through the sea cock, it is also used for clearing the bilge suction pipe if it should become choked, washing the decks, wetting the sails, or for syphoning water from sea cock through the pump to the lower part of vessel.

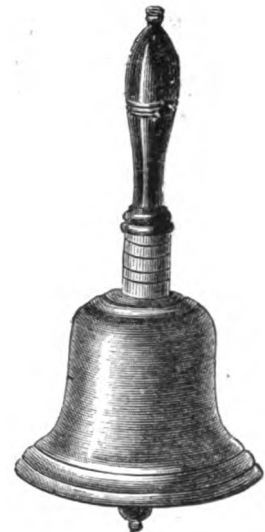
Size of Pump	.. .. .	4½"	5"	6"	7"
Price per foot, including Union	..	3/0	3/0	3/3	3/3



POLISHED SHIP'S BELL,
Mounted on Gun-Metal
Brackets.
Price @ per lb.



POLISHED SHIP'S BELL,
Mounted in Gun-Metal Frame and
Stand.
Price @ per lb.



HAND BELLS.
Price @ per lb. Polished.
" " " Rough.

JOHN DEWRANCE AND CO.,

176, GREAT DOVER STREET, LONDON, S.E.

3 A 2

BELLS AND FITTINGS.

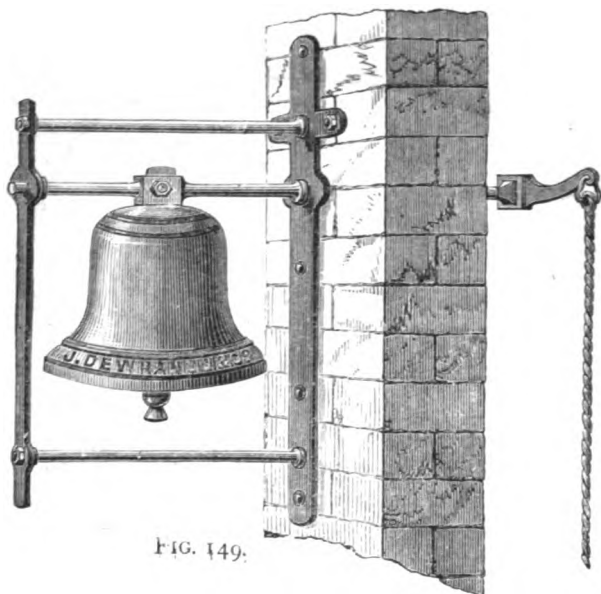


FIG. 149.



FIG. 150.

FIG. 149. YARD, FACTORY, OR FIRE BELL, MOUNTED IN WROUGHT-IRON FRAME, WITH SPINDLE PASSING THROUGH THE WALL. When ordering, please state thickness of wall.

Diameter of Bell	6"	8"	9"	10"	11"	12"	13"	14"
Price	40/0	58/0	68/0	82/6	110/0	132/0	168/0	195/0

FIG. 150. YARD, FACTORY, OR FIRE BELL, MOUNTED IN WROUGHT-IRON BRACKET.

Diameter of Bell	6"	8"	9"	10"	11"	12"	13"	14"
Price	39/0	55/0	64/0	79/0	104/0	125/0	162/0	180/0

Bells of all sizes made to order.

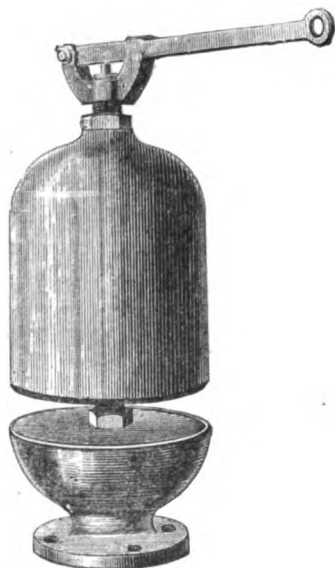


FIG. 47.

J. DEWRANCE AND CO'S.

IMPROVED GUN-METAL STEAM FOG-SIGNAL, WITH
ENCLOSED VALVE, FOR STEAM-SHIPS,
COAST STATIONS, &c.

Diameter of Bell	6"	8"	10"	12"
Price	88/0	122/0	250/0	315/0

JOHN DEWRANCE AND CO.,
176, GREAT DOVER STREET, LONDON, S.E.

GENESTE'S PATENT CONTRACTING PUMP BUCKET.

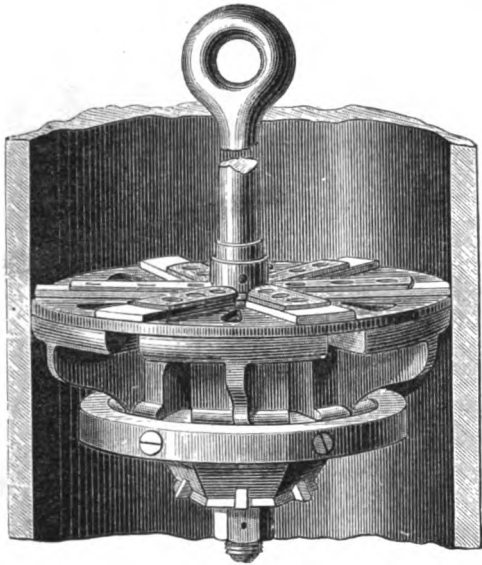


FIG. 203.

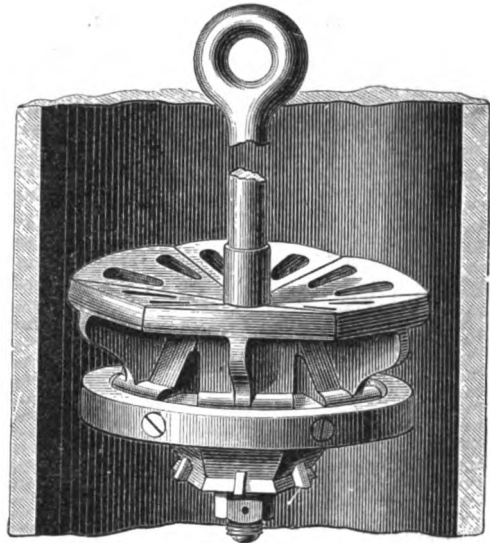


FIG. 203A.

The advantage of a good Pump Bucket that, while being perfectly tight on the up or suction stroke, shall be entirely frictionless on the down stroke, is too obvious to need any remark, and the use of such a Bucket in Sand Pumps, and in Deep-Well Pumping, by enabling the Pumps to be worked by chain or rope, is also apparent.

The Geneste Patent Contracting Pump Bucket not only descends entirely frictionless, but—as will be seen on referring to the Drawing, which shows the Bucket both in its up and down strokes—by contracting itself in the outside and largest diameter, gives a greater area for the water to flow past than any other arrangement of Bucket Valve; while at the same time it allows sand or other materials to more easily escape to the upper part of the Bucket, without injuring it or destroying the efficiency of the stroke.

As the Bucket descends by its own gravity, a slight rod, a chain, or even a rope, will work the Pump easily, the tension being a little more than the weight of the column of water to be lifted, plus the friction of the piston.

In fixing a Pump, a great saving of time and expense is effected, and all subsequent repairs can be executed without breaking any joints, which considerably lessens the cost.

The use of these Pump Buckets will be found of great advantage in ordinary Water Pumps, and it is also specially adapted for "Kennard's Patent Sand Pumps," which are now largely used in India, Egypt, and other places for sinking Cylinder foundations, &c.

In these Sand Pumps a tight Bucket will be a great improvement, and from their construction a chain or rope can be used instead of a rod.

The prices include a short length of rod fitted to centrepiece and the eye, which can be welded together to suit any length of stroke.

Messrs. J. DEWRANCE AND CO., 176, Great Dover Street, London, S.E., are the sole Licensees and Manufacturers of the GENESTE PATENT CONTRACTING PUMP BUCKET, and are prepared to supply them at the following prices :

Size, Gun Metal	..	2"	2½"	3"	3½"	4"	5"
Price	.. ..	7/6	10/0	14/6	16/0	18/6	26/0
Size, Cast Iron	..	6"	7"	8"	9"	10"	11"
Price	.. ..	22/6	27/0	33/6	41/0	50/0	60/0

For Larger Sizes upon application.

JOHN DEWRANCE AND CO.,

176, GREAT DOVER STREET, LONDON, S.E.

STEAM FITTINGS.

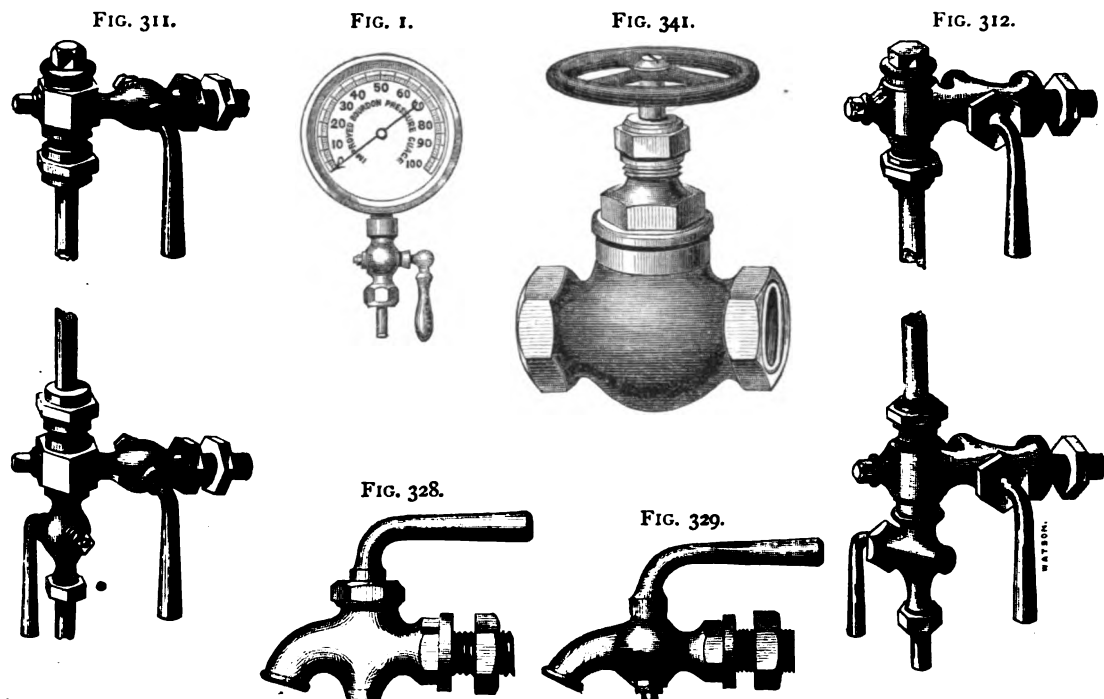


FIG. 311.	STRONG SCREW BOTTOM GUN-METAL WATER GAUGES	$\frac{3}{8}$ "	$\frac{1}{2}$ "	$\frac{5}{8}$ "	$\frac{3}{4}$ "				
		15/0	18/0	23/0	25/6				
FIG. 1.	IMPROVED BOURDON PRESSURE GAUGES (BEST MAKE), WITH GUN-METAL COCK AND UNION, BRASS CASE, OPEN DIAL	3"	4"	5"	6"	7"			
		22/6	24/0	26/6	28/6	31/6			
	DITTO, CLOSED DIAL	19/6	21/0	23/6	25/6	28/0			
FIG. 341.	GUN-METAL GLOBULAR STEAM VALVES, WITH WHEELS	$\frac{1}{2}$ "	$\frac{3}{4}$ "	1"	$1\frac{1}{4}$ "	$1\frac{1}{2}$ "	2"	$2\frac{1}{2}$ "	3"
		4/3	5/8	8/6	12/2	14/10	23/6	45/0	58/6
FIG. 312.	GUN-METAL WATER GAUGE, WITH GLAND COCKS	$\frac{1}{2}$ "	$\frac{5}{8}$ "	$\frac{3}{4}$ "					
		23/0	31/6	34/6					
FIG. 328.	GUN-METAL GAUGE COCKS, WITH GLANDS	$\frac{3}{8}$ "	$\frac{1}{2}$ "	$\frac{5}{8}$ "	$\frac{3}{4}$ "				
		4/1	5/2	6/6	7/3				
	DITTO, WITH BACK NUT	4/9	6/0	7/3	8/3				
FIG. 329.	GUN-METAL GAUGE COCKS, SCREW BOTTOM	$\frac{3}{8}$ "	$\frac{1}{2}$ "	$\frac{5}{8}$ "	$\frac{3}{4}$ "				
		3/5	4/6	5/0	5/9				
	DITTO, WITH BACK NUT	4/0	5/5	6/0	6/9				

R. F. DALE AND CO.,
BRASS FOUNDERS, BEAR LANE, SOUTHWARK STREET, LONDON.

FIRE COCKS AND FITTINGS.

FIG. 351.

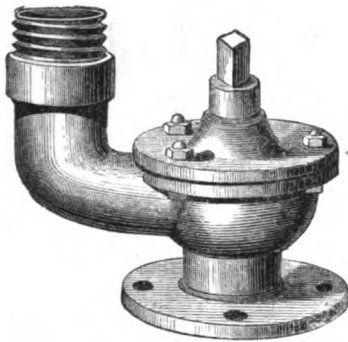


FIG. 350.

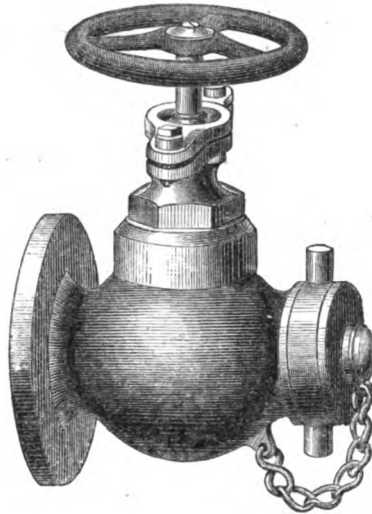


FIG. 342.

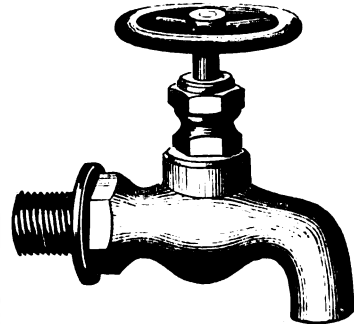


FIG. 317.

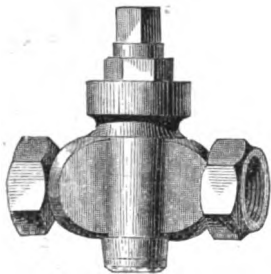


FIG. 352.

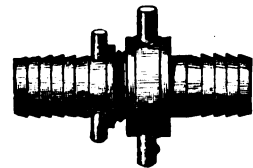


FIG. 354.

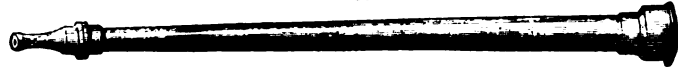


FIG. 351. CAST-IRON HYDRANT VALVE, WITH GUN-METAL INTERNAL PARTS ..		2½" Brigade. 27/0					
FIG. 350. GUN-METAL FIRE VALVE, WITH CAP AND WHEEL COMPLETE		2" 43/0		2½" Brigade. 63/0			
FIG. 342. GUN-METAL STEAM BIB VALVE.. ..		¾" 8/6		1" 12/6			
DITTO, WITH BACK NUT		9/6		13/6			
FIG. 317. GUN-METAL SOLID BOTTOM STEAM COCKS	ROUGH	½"	¾"	1"	1¼"	1½"	2"
	BRIGHT	4/6	6/1	9/0	14/0	22/0	42/0
DITTO		5/0	6/7	10/0	15/6	24/6	44/0
FIG. 352. GUN-METAL HOSE CONNECTIONS ..		1¼"	1½"	2"	2½"		
		4/0	4/6	7/6	11/6		
FIG. 354. STRONG COPPER BRANCH PIPES, WITH GUN-METAL CONNECTIONS		1¼"	1½"	2"	2½"		
		12/0	13/6	18/0	22/6		

R. F. DALE AND CO.,
BRASS FOUNDERS, BEAR LANE, SOUTHWARK STREET, LONDON.

STEAM FITTINGS.

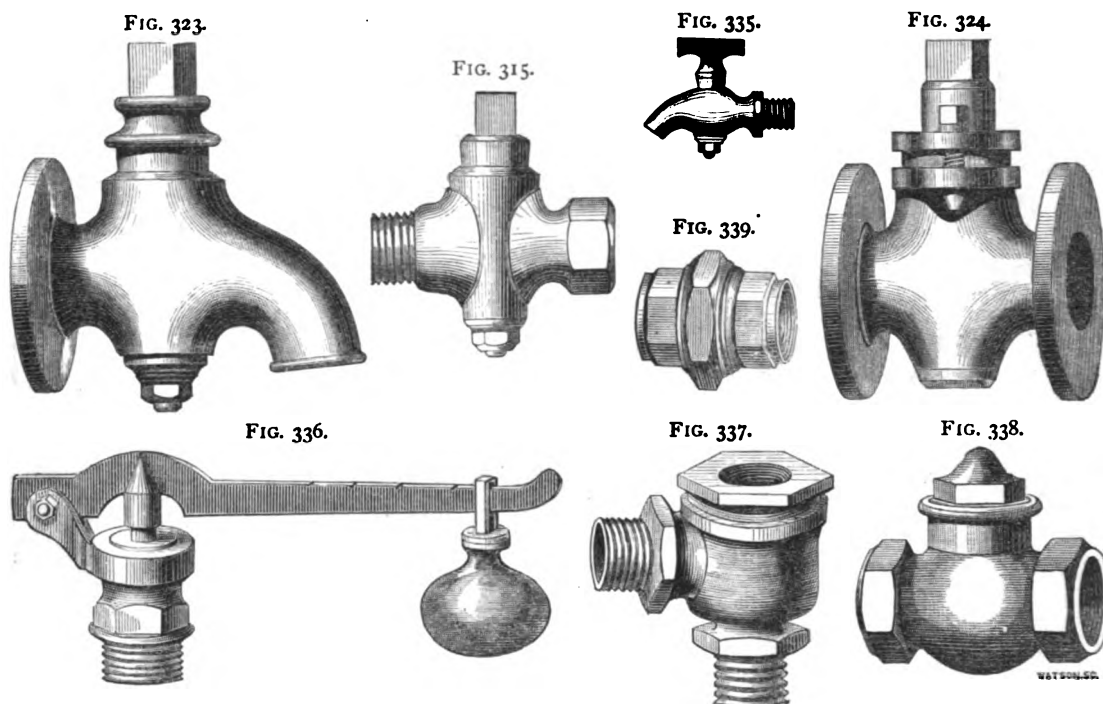


FIG. 315. GUN-METAL SCREW BOTTOM STEAM COCKS	1"	3"	1"	1 1/4"	1 1/2"	2"
DITTO BRIGHT	2/11	4/3	7/0	11/0	17/0	28/0
FIG. 323. STRONG GUN-METAL BIB COCKS, SCREW BOTTOM, WITH FLANGE	1 1/2"			2"		2 1/2"
DITTO, WITH GLAND PLUG	22/6			40/0		65/0
FIG. 324. STRONG GUN-METAL GLAND STOP COCKS, WITH FLANGES	1 1/2"			2"		2 1/2"
DITTO, SCREW BOTTOM	29/0			56/0		79/0
FIG. 336. GUN-METAL SAFETY VALVES, WITH LEVERS AND HOLLOW WEIGHTS ..	1 1/2"	3"	1"	1 1/4"	1 1/2"	2"
FIG. 337. GUN-METAL VACUUM VALVES	5/6	6/9	9/6	12/0	14/0	20/6
FIG. 338. GUN-METAL BACK PRESSURE VALVES	3"	1"	1 1/4"	1 1/2"	2"	2 1/2"
FIG. 339. STRONG GUN-METAL STEAM UNIONS..	4/6		8/6	10/6		15/0
	3"	1"	1 1/4"	1 1/2"	2"	2 1/2"
	4/6	7/3	10/6	12/6	20/0	34/6
	3"	1"	1 1/4"	1 1/2"	2"	
	2/9	4/0	5/2	7/3	10/6	

R. F. DALE AND CO.,

BRASS FOUNDERS, BEAR LANE, SOUTHWARK STREET, LONDON.

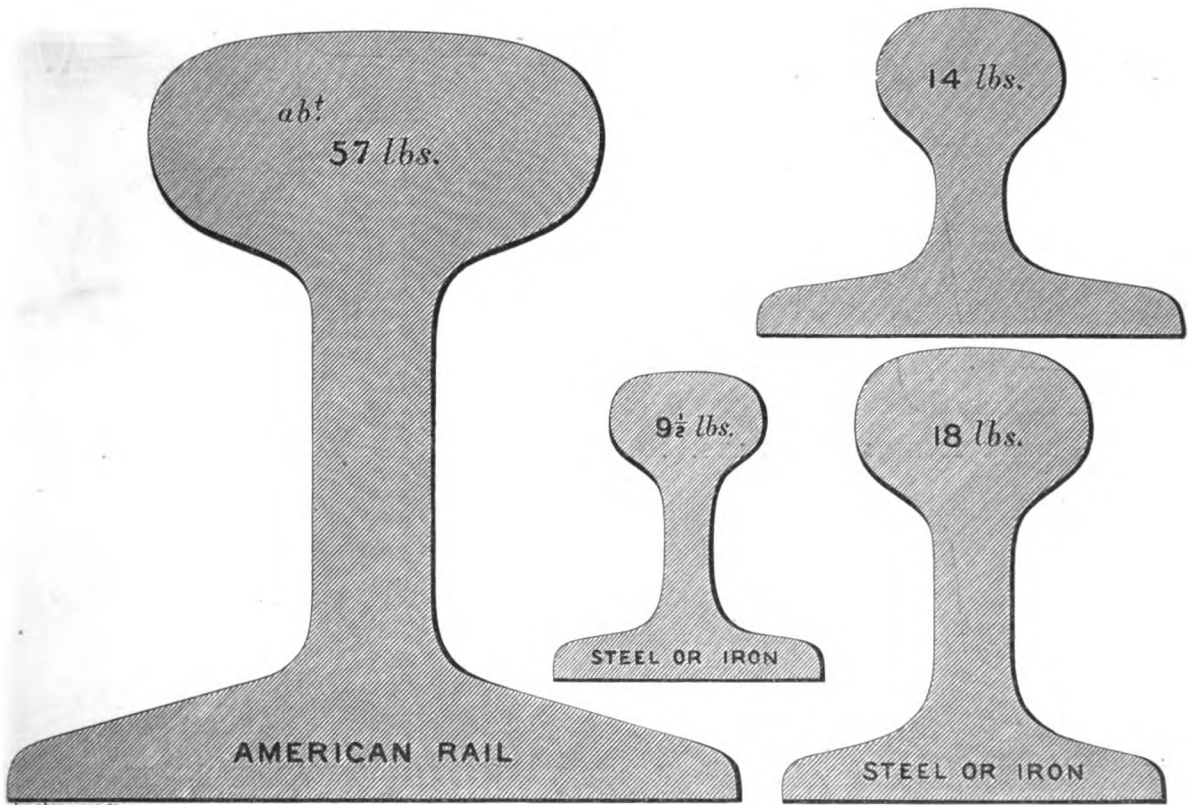
IRON AND STEEL RAILS.

PRICE CURRENT.

RAILS (Iron and Steel).—Section Sheets, Nos. 1 to 7.

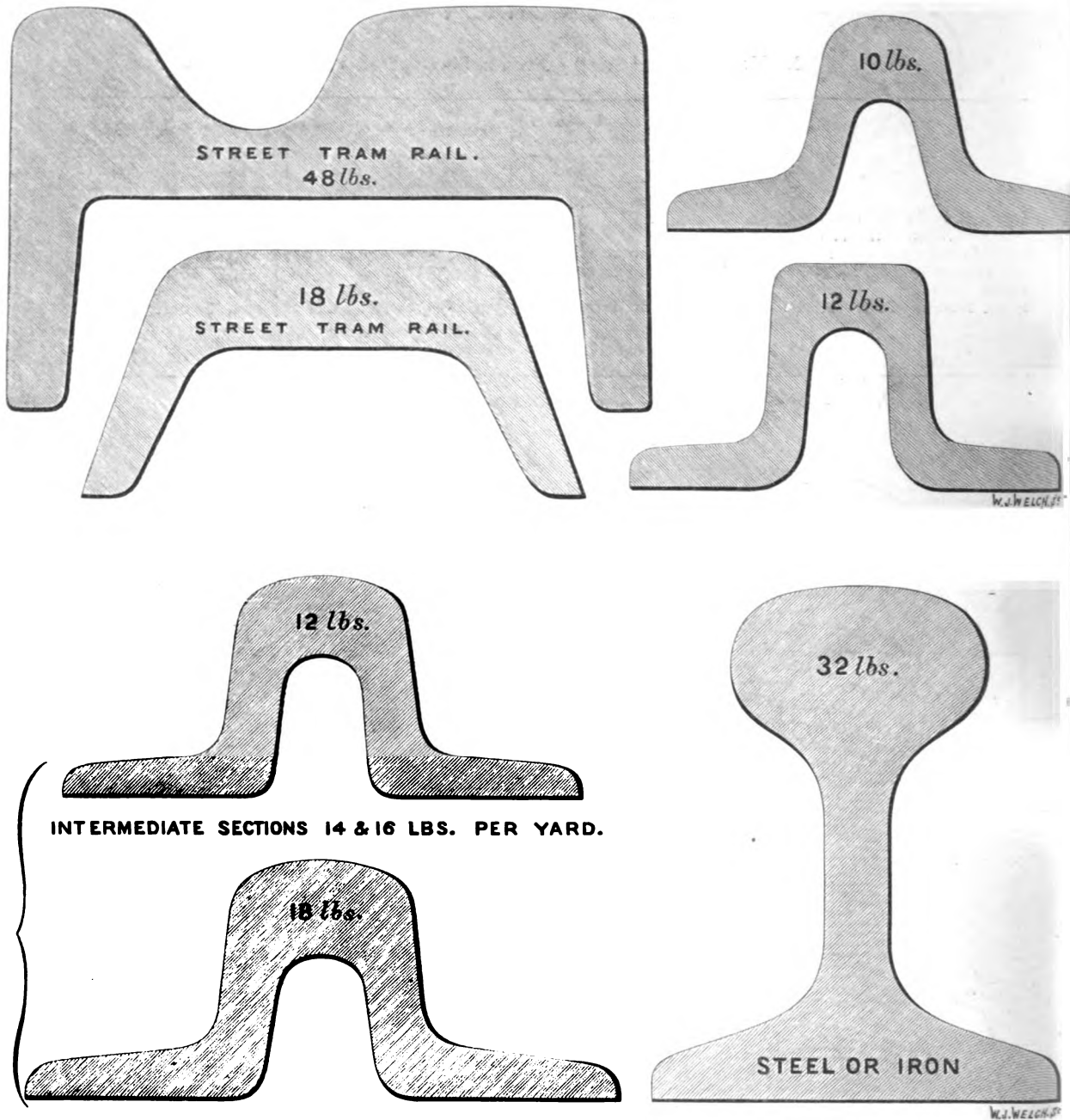
	Lbs. per Yard.	Delivery f. o. b. for Wales or West Coast.				Delivery f. o. b. for East Coast.				Delivery f. o. b. for Foreign Ports.			
		Iron.		Steel.		Iron.		Steel.		Iron.		Steel.	
		£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.
Heavy Rails for Slidings, 1 &c.	56 to 70	6 15	to 7 0	9 15	to 10 0	6 15	to 7 0	10 0	to 10 5	6 15	to 7 0	10 0	to 10 5
Light Colliery Rails . . .	10 „ 30	8 5	„ 8 10	10 15	„ 11 0	8 0	„ 8 5	11 0	„ 11 10	8 0	„ 8 5	9 10	„ 9 15
Light Permanent-way Rails	28 „ 45	7 5	„ 7 10	10 10	„ 10 15	7 5	„ 7 10	11 5	„ 11 10	7 5	„ 7 10	11 5	„ 11 10
Heavy do. do.	56 „ 80	7 0	„ 7 5	9 10	„ 10 0	7 0	„ 7 5	10 0	„ 10 10	7 0	„ 7 5	10 5	„ 10 10
Street Tramway Rails . .	40 „ 60	7 5	„ 7 10	11 0	„ 11 5	7 15	„ 8 0	11 0	„ 11 5	7 15	„ 8 0	11 0	„ 11 5
		London, 12/6 per ton extra.				London, 10/ per ton extra.							
		Liverpool, 10/ „ „				Liverpool, 12/6 „ „							

Rails, with Fishplates, Bolts and Nuts, and Spikes, 10s. to 20s. per ton extra, according to Section.



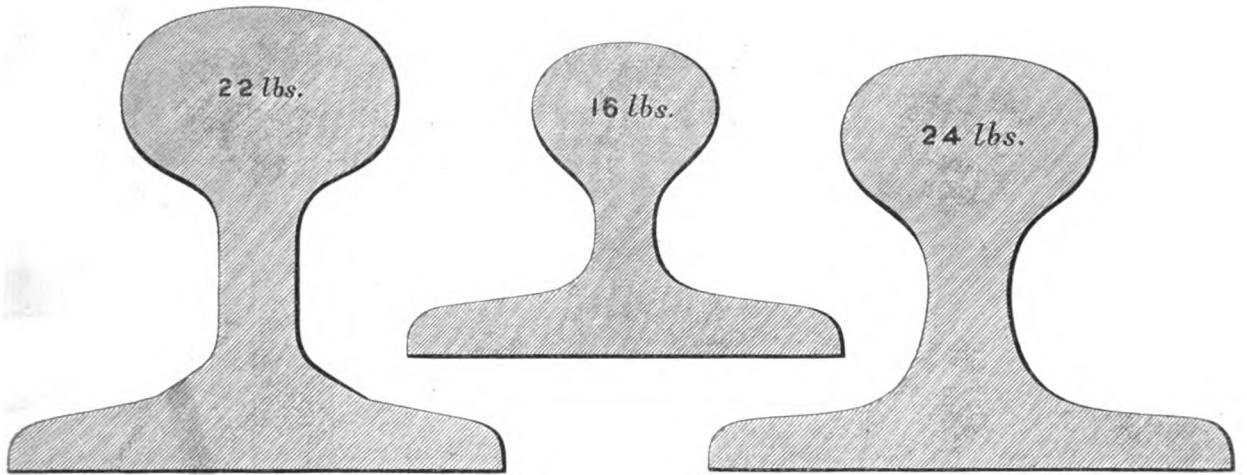
WM. BIRD AND CO., LONDON,
2, LAURENCE POUNTNEY HILL.

IRON AND STEEL RAILS—continued.



WM. BIRD AND CO., LONDON,
2, LAURENCE POUNTNEY HILL.

IRON AND STEEL RAILS—continued.



INTERMEDIATE SECTIONS.
14.16 & 18 LBS. PER YARD.

STREET TRAM RAIL
48 lbs.

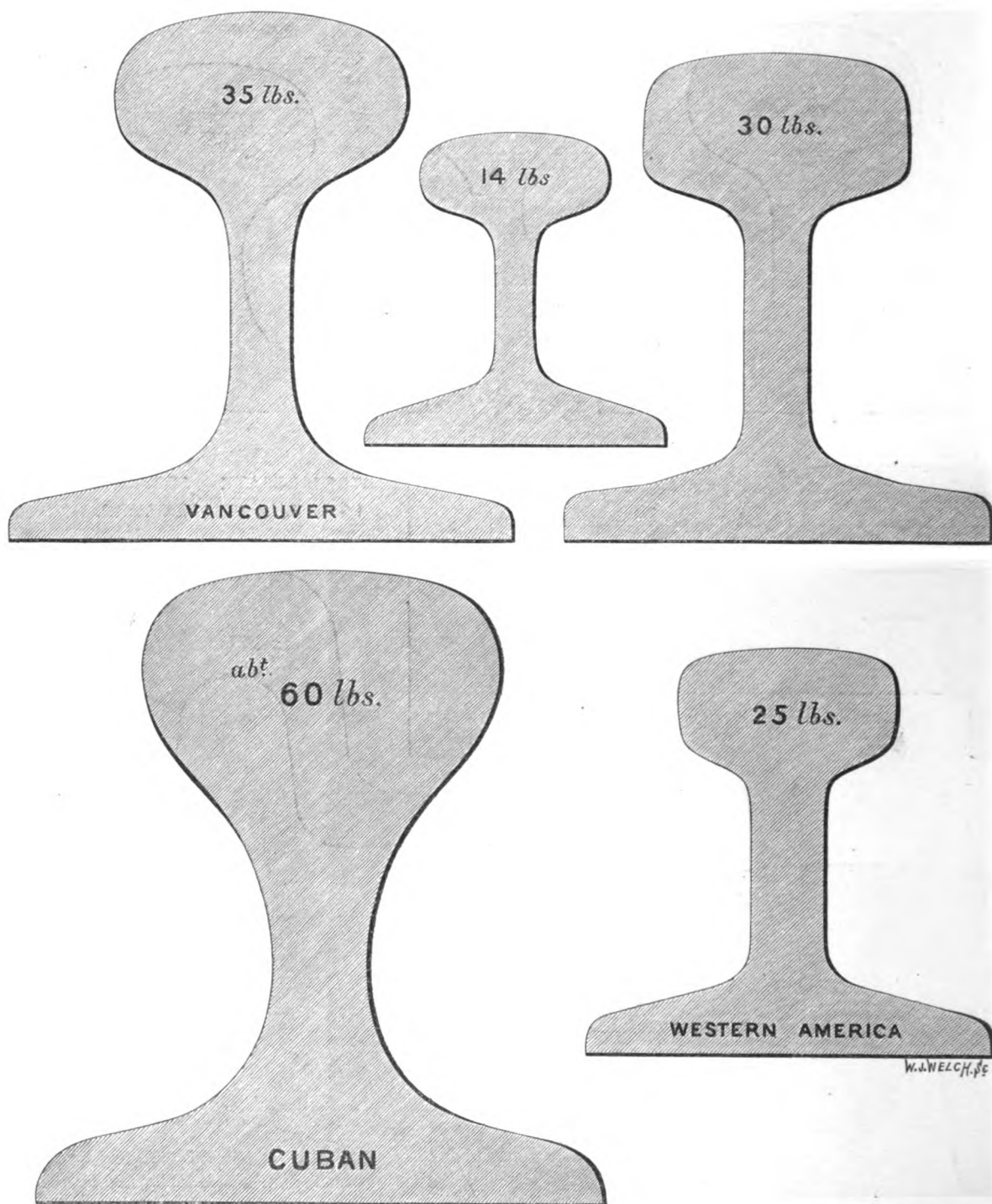
20 lbs.

STREET TRAM RAIL
34 lbs.

18 lbs.

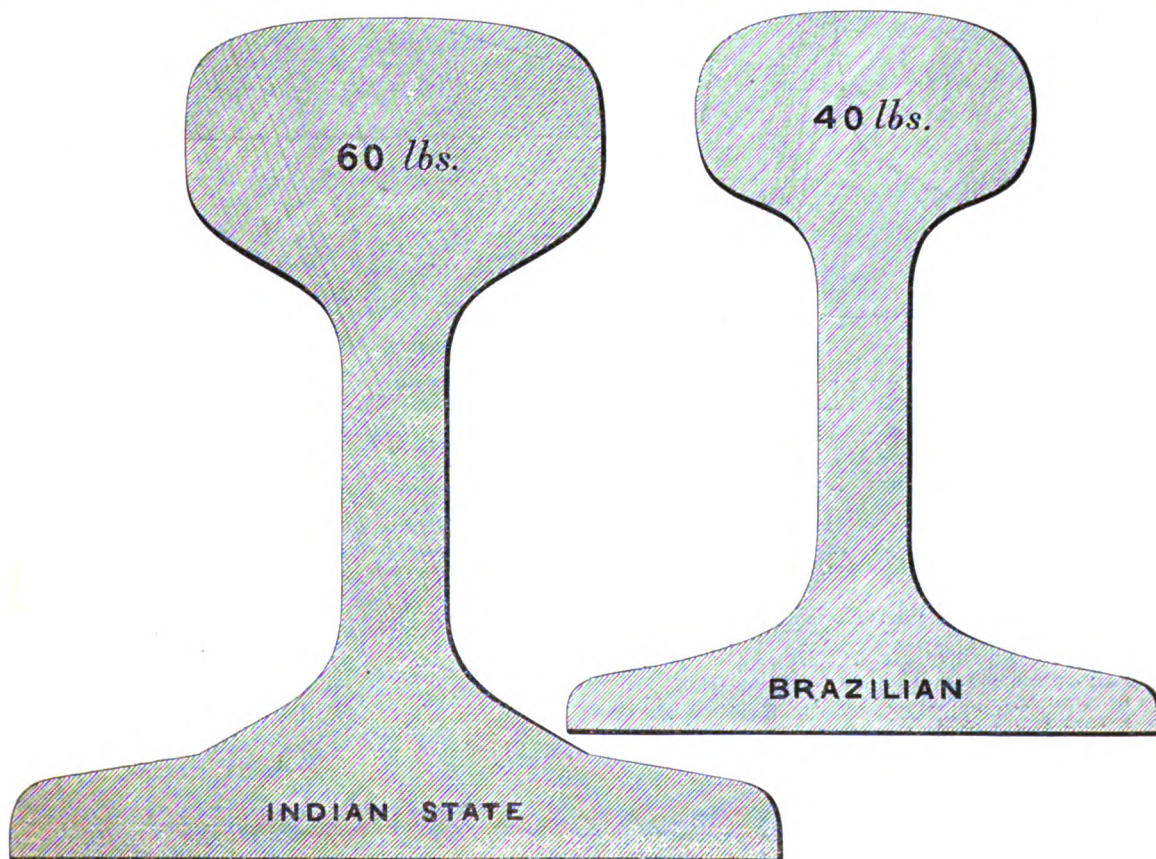
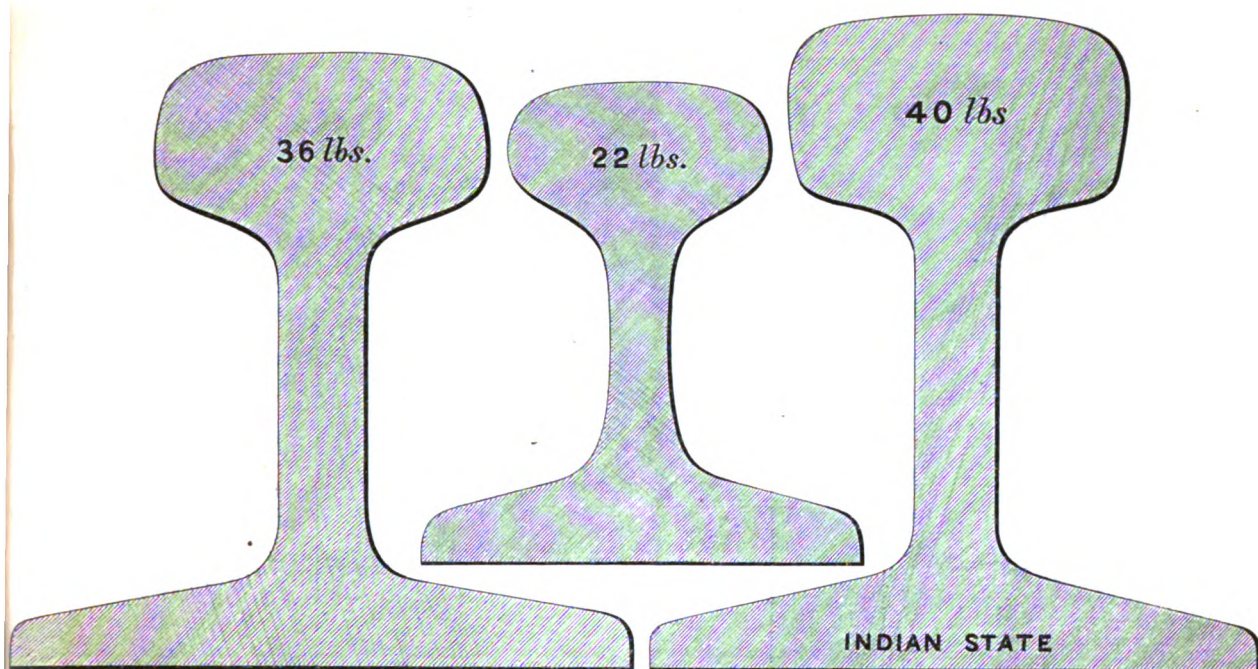
WM. BIRD AND CO., LONDON,
2, LAURENCE POUNTNEY HILL.

IRON AND STEEL RAILS—continued.

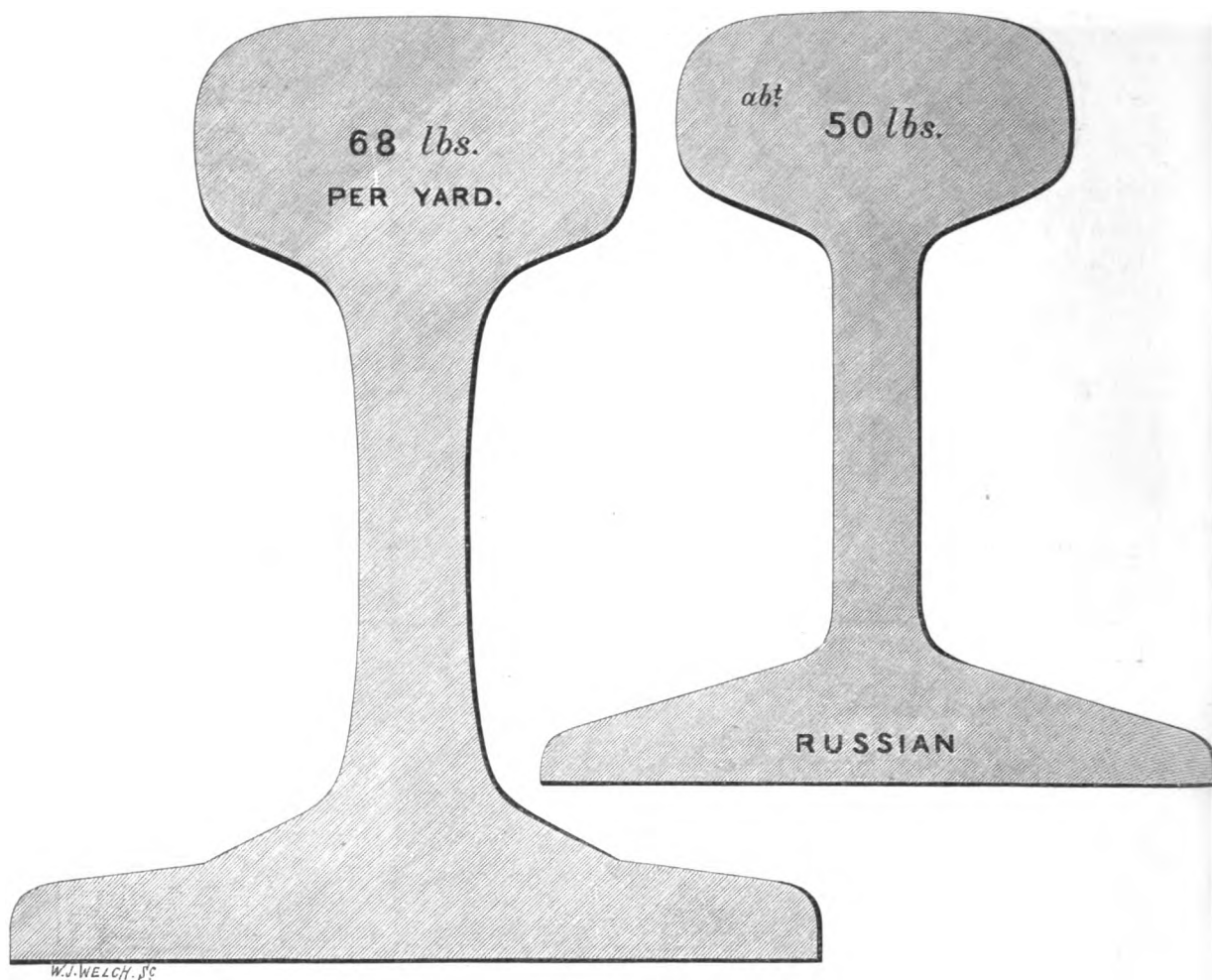


WM. BIRD AND CO., LONDON,
2, LAURENCE POUNTNEY HILL.

IRON AND STEEL RAILS—continued.



IRON AND STEEL RAILS—continued.



GALVANIZED IRON FOR ROOFING, &c.

	16	18	26	22	24	26	28	gauge.
GALVANIZED FLAT SHEETS	£19	10s.	£20	£22	£25	£23	10	per ton.
Best ditto, 20s. per ton extra.								
GALVANIZED CORRUGATED SHEETS				£21	10s.		25	0
Best ditto				22	10s.		25	10
Packing in close Cases— $\frac{1}{4}$ ton, each 30s. per ton.								
Skeleton Cases—5 cwt., each 15s. per ton.								
Close Cases—10 cwt., 25s. per ton extra.								
GALVANIZED TILES—3 feet by 2 feet, in Cases } of 100 each	24 gauge, £7	26 gauge, £6	10s.	28 gauge, £6				per case.
MOULDED GUTTERS	3 in., 4d.	4 in., 5 $\frac{1}{2}$ d.	5 in., 7d.	6 in., 8d.				foot.
RAIN-WATER PIPES	" 3 $\frac{1}{2}$ d.	" 5d.	" 8d.	" 10d.				" "
RIDGING	15 " 5 $\frac{1}{2}$ d.	18 " 6 $\frac{1}{2}$ d.	20 " 7 $\frac{1}{2}$ d.					" "
RIVETS AND WASHERS, 38s. per cwt.								
SCREWS, 1 $\frac{1}{2}$ in., 62s. per cwt.								
NAILS, 1 $\frac{1}{2}$ in., 42s. per cwt.								

DELIVERY—Liverpool or Hull; if in London, 5s. per ton extra.

WM. BIRD AND CO., LONDON,
2, LAURENCE POUNTNEY HILL.

MERCHANT IRON.

	STAFFORDSHIRE.			MIDLAND AND OTHER DISTRICTS.	NORTH OF ENGLAND.		WALES.	SCOTLAND.			YORKSHIRE.
	Coinmon. Per Ton.	Good Marked V. R.V. Per Ton.	List Brands. Per Ton.	Per Ton.	Per Ton.	 Quality. Per Ton.	Per Ton.	Per Ton.	Per Ton.	Best Quality. Per Ton.	Lowmoor, Bowling, &c. Per Ton.
	£ s.	£ s.	£ s.	£ s. d.	£ s.	£ s.	£ s.	£ s. d.	£ s. d.	£ s. d.	£ s.
BAR IRON (Ordinary Sizes)	9 10	10 0	10 10	8 17 6	8 0	8 10		8 0	8 7 6	8 17 6	21 0
Rivet Iron	10 0	10 10	11 0	9 17 6	10 0	10 10			8 17 6	9 7 6	21 0
Chain Iron	10 10	11 0	11 10	10 7 6	10 10	11 0			9 7 6	9 17 6	23 0
Nail Rods	9 10	10 0	10 10	10 17 6	8 10	9 0	8 10		8 17 6	9 7 6	23 0
PLATES, Tank	11 5	11 15	13 10	12 0 0	9 15	10 5		8 10	10 7 6	10 17 6	
Ship				10 10 0	8 15	9 5			9 7 6	9 17 6	
Boiler	11 5	11 15	13 10	11 0 0	9 5	9 15			10 5 0	11 5 0	25 0
Chequered	12 5	12 10	14 10	11 10 0	10 15	11 5			11 0 0	11 10 0	27 0
SHEETS, singles	11 5	11 15	13 10	13 0 0					10 5 0	10 15 0	27 0
HOOPS, ordinary gauges	10 10	11 0	11 10	10 5 0							25 0
ANGLE IRON (To 8 united inches.)	10 5	10 15	11 5	9 5 0	8 10	9 0			8 15 0	9 5 0	24 0
TEE IRON	10 15	11 0	11 10	10 0 0	9 10	10 0			9 5 0	9 15 0	26 0
SASH AND FANCY IRON	10 15	11 15	12 10	12 0 0	11 0	11 10			9 15 0	10 5 0	25 0
BULB IRON	11 0	12 0	13 0	12 10 0	8 10	9 0			8 15 0	9 5 0	27 0
TYRE BARS	10 10	11 10	12 10	12 0 0	10 10	11 0			10 10 0	11 0 0	22 10
Extra for BEST Iron	20s.	20s.	30s.	10s.	10s.		10s.		10s.		
„ BEST „ „	30s.	40s.	50s.	30s.	30s.				30s.		
„ TREBLE „ „	50s.	60s.	90s.	60s.	50s.				50s.		
Delivery in Liverpool. London } 5s. to 7s. 6d. Hull } per ton extra.				Delivery in Liverpool.	Delivery in Tyne or Tees. London, 10s., Liverpl., 12s. 6d., Hull, 6s., per ton extra.		Delivery in New- port or Cardiff. London, 12s. 6d., Liverpool, 11s. per ton extra.	Delivery in Glasgow or Leith. London } 13s. 6d. Liverpool } per ton extra.			Delivery at Works. London, 10s. or Liverpool, 10s. Hull, 5s. per ton extra.

JOIST, GIRDER, AND CHANNEL IRON.—Section Sheets, Nos. 17 to 30.

CURRENT SIZES.

JOIST IRON.				GIRDER IRON.				CHANNEL IRON.			
Sheet.	No.	Size in Inches.	Price per Ton.	Sheet.	No.	Size in Inches.	Price per Ton.	Sheet.	No.	Size in Inches.	Price per Ton.
FOREIGN.	19 ..	3 .. 3½ × 1½	£ s. £ s.	21 ..	5 ..	4½ × 2½	£ s. £ s.	29 ..	2 ..	2 × 1	£ s. £ s.
	23 ..	9 .. 4 „ 1½		27 ..	1 ..	6½ „ 3½	9 10 to 10 0	28 ..	1 ..	3 „ 1½	
	23 ..	8 .. 4½ „ 1½		28 ..	2 ..	7½ „ 3½				2½ „ 1½	9 15 to 10 5
	23 ..	6 .. 5½ „ 1½	9 0 to 9 10	21 ..	6 ..	8 „ 4				4½ „ 2½	
	23 ..	1 .. 6 „ 1½		21 ..	2 ..	7½ „ 5½				5½ „ 2½	
	23 ..	4 .. 7½ „ 2½		25 ..	2 ..	9½ „ 3½	10 0 „ 10 10			6 „ 2½	
	19 ..	6 .. 8½ „ 2½		25 ..	6 ..	9½ „ 3½				6½ „ 2½	
	29 ..	1 .. 7½ „ 2½		20 ..	4 ..	9½ „ 4½				7½ „ 3½	
				19 ..	4 ..	12 „ 6	10 10 „ 10 15	30 ..	13 ..	9½ „ 3½	10 0 „ 10 10
				19 ..	3 ..	11½ „ 5				10½ „ 3½	
ENGLISH.	24 ..	3 .. 4 „ 1½		20 ..	3 ..	15½ „ 5½	11 10 „ 12 0			11½ „ 2½	
	24 ..	10 .. 5 „ 1½		24 ..	11 ..	3 „ 3		29 ..	6 ..	1½ „ 1½	
	24 ..	5 .. 5½ „ 1½		22 ..	2 ..	6½ „ 3½	12 10 „ 13 0	23 ..	2 ..	2 „ 2	
	22 ..	8 .. 5½ „ 2	10 10 to 10 15	28 ..	5 ..	8 „ 4½	13 0 „ 13 10	29 ..	16 ..	2½ „ 1½	11 0 „ 11 10
	22 ..	6 .. 6½ „ 2½		27 ..	8 ..	5½ „ 4		29 ..	7 ..	3 „ 1½	
	28 ..	10 .. 7 „ 2½				5½ „ 5	13 10 „ 14 0	22 ..	4 ..	3½ „ 1½	
	29 ..	1 .. 8 „ 2½				9 „ 5½		29 ..	18 ..	4 „ 3	
				25 ..	2 ..	9½ „ 3½		29 ..	15 ..	4½ „ 2	13 0 „ 13 10
				27 ..	5 ..	5½ „ 5½	14 0 „ 15 0	29 ..	4 ..	5 „ 2½	
				22 ..	5 ..	10 „ 5		29 ..	1 ..	6 „ 2½	
				26 ..	2 ..	12 „ 5	14 10 „ 15 0	29 ..	14 ..	7 „ 2½	14 0 „ 14 15
				24 ..	2 ..	12 „ 6		29 ..	20 ..	8 „ 3½	
								30 ..	13 ..	9½ „ 3½	

Lengths up to 20 feet without extra. Sawing hot to lengths included. Dead lengths, cut cold, 7s. 6d. per ton extra.

DELIVERY—London, Liverpool, or Hull.

WM. BIRD AND CO., LONDON,
2, LAURENCE POUNTNEY HILL.

STEEL.

	Per cwt.
DOUBLE SHEAR STEEL, for Hammers,	45/0 to 65/0
Picks, &c.	
SINGLE ditto	34/0,, 60/0
OCTAGON BORER STEEL.. .. .	28/0,, 75/0
SPRING STEEL	18/6,, 30/0
CAST STEEL, for Turning Tools, Chisels,	35/0,, 65/0
&c.	

	Per cwt.
SPECIAL DIE STEEL.. .. .	90/o to 112/o
BLISTER STEEL	26/o „ 30/o
Ditto Genuine	38/o „ —
CAST STEEL SHEETS	32/o „ 50/o
BESSEMER STEEL ditto	22/o „ 38/o
CRUCIBLE STEEL CASTINGS, according to pattern.. .. .	34/o „ 48/o

				Per lb.
HAND HAMMERS, 1½-lb. upwards,				
Solid Cast Steel			0/10, 1/0, & 1/2	
SLEDGE HAMMERS, ditto			0/8, 0/9, „ 0/10	
Ditto Iron and Steel			0/4, 0/6, „ 0/8	

	Per lb.
STONE-BREAKING HAMMERS, Solid } Cast Steel }	o/8, o/9, & o/10
Ditto, Iron and Steel }	o/4, o/6, .. o/8

In ordering Steel it is advisable to state the purpose for which the Steel is required, so that the proper quality and temper may be sent.

ANY SHEFFIELD BRANDS OF STEEL SUPPLIED AS CUSTOMERS DESIRE.

FILES.—For List Prices, see Sheets Nos. 17 and 18.	Discount	%	Best Hand Cut,	%
SAWS.— Ditto ditto 19.	Ditto	%	Best,	%

DELIVERY—London, Liverpool, or Hull.

CHAINS, CABLES, AND ANCHORS.

[illegible]

BEST CRANE CHAIN 18/9 19/0 19/3 20/0 20/6 21/0 23/3 25/6 28/6 30/6 36/6 „
Best Best ditto, 2/o per cwt. extra.
B.B.H. Best, ditto 25/3 25/6 26/0 27/0 27/9 28/6 31/9 35/0 40/0 44/6 68/0 „
Special Best Best, ditto, 2/o per cwt. extra.

[illegible]

ANCHORS.	1 to 2	2 to 5	5 to 8	8 to 20	20 to 40	40 to 60 cwt.
Ordinary Shape	25/6	21/6	21/0	20/9	21/3	22/0 per cwt.
RODGERS' PATENT	26/6	22/6	22/0	21/9	22/0	22/6 „
TROTMAN'S or PORTER'S	112/0	70/0	25/6	24/3	24/9	27/6 „

Other Patent Anchors at corresponding Prices.

DELIVERY.—London, Liverpool, or Hull.

TIN PLATES.

	Cwt.	Coke.	Best Coke.	Charcoal.	Best Charcoal.
I.C.—Size, 14 × 10 .. 225 Sheets per I box		23 @ 24s.	26 @ 27s.	28s.	31s.
Wor Wasters generally, 2s. per box lower than Primes.					

Size, 14 X 10. 225 sheets per box.	Size, 15 X 11. 200 sheets per box.	Size, 17 X 12½. 100 sheets per box.
IX .. 140 lb. per box .. 6s.	SDC .. 168 lb. per box .. 22s.	DC .. 98 lb. per box 4s. below.
IXX .. 161 „ „ 12s.	SDX .. 189 „ „ 28s.	DX .. 126 „ „ 2s.
IXXX .. 182 „ „ 18s.	SDXX .. 210 „ „ 34s.	DXX 147 „ „ 8s.
IXXXX.. 203 „ „ 24s.	SDXXX 231 „ „ 40s.	DXXX 168 „ „ 14s.
Per box, above I.C.	SDXXXX 252 „ „ 46s.	DXXXX189 „ „ 20s.
	Per box, above I.C.	

TERNE PLATES. 2s. per box less than Tin Plates.

Delivery.—London, Liverpool, or Hull. Cases lined with Tin, usual extra. Hooping Cases, 4d. per box extra. Foreign and other sizes of Tin Plates at proportionate difference in price, according to size.

WM. BIRD AND CO., LONDON,
2, LAURENCE POUNTNEY HILL.

WIRE FOR FENCING, TELEGRAPHS, &c.

	No. 0 to 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10
Rolled Fencing Wire .. per ton	£10 5	£11 0	£11 15	£12 ..	£12 ..	£12 ..	£12 ..
Galvanized	14 0	14 10	15 5	15 15	16 5	16 15	17 5
Bright	15 5	15 5	15 5	16 5	16 5	17 5	17 5
Drawn Fencing Wire	13 0	13 0	13 0	14 0	14 15	15 5	16 5
Galvanized	17 5	17 5	17 5	18 0	18 15	19 15	20 15
Drawn Galvanized Telegraph Wire ..	19 5	19 5	20 5	20 5	20 5	21 0	21 15
Best Refined ditto, 3s. per cwt. extra.							
Charcoal ditto, 7s. ..							

	Nos. 0	1	2	3	4	5	6	7	8
Galvanized Fencing Strand, 7 ply, per cwt. ..	27s. 3d.	27s. 6d.	28s.	28s. 6d.	30s.	31s.	32s.	33s. 9d.	35s. 6d.
Fencing Staples .. Nos. 5 and 6 ..	18s.	Nos. 7 and 8 ..	19s. per cwt.						

DELIVERY.—London, Liverpool, or Hull, coiled for shipment.

CAST-IRON SOCKET PIPES FOR GAS AND WATER.

Internal diam. } Inches.	1½	2	2½	3	4	5	6	7	8	9	10	12	15	18	24	36
Per ton ..	7 5	7	6.17	6						6 15				6 12 6		6 10

TUBES FOR GAS, STEAM, AND WATER.

	$\frac{1}{2}$	$\frac{3}{4}$	1	1 $\frac{1}{2}$	1 $\frac{3}{4}$	2	2 $\frac{1}{2}$	3 $\frac{1}{4}$	3	3 $\frac{1}{2}$	4 in. internal diameter.	
Wrought Iron	3d.	4 $\frac{1}{2}$ d.	6d.	8d.	11d.	1s. 2d.	1s. 9d.	2s. 6d.	3s. 3d.	4s. 6d.	5s. 6d.	7s. per foot.
Discount {	per cent. for Gas Tubes, screwed and socketed.					For List Price of Fittings, see Sheet No. 10 of Album.						
	ditto Steam					ditto						

LAP-WELDED IRON BOILER TUBES.

External diameter ..	1½ in. × 14 gauge	1½ × 13	2 × 12	2½ × 11	3 × 11	3½ × 10	4 × 9	4½ × 9	5 × 8	6 × 7 Thickness.
	9½d.	10d.	11d.	1s. 1½d.	1s. 4½d.	1s. 9½d.	2s. 4d.	2s. 9d.	3s. 8d.	5s. 3d. per foot.
Discount,	per cent.									
Brass Tubes, for Locomotive and Marine Boilers ..										9½d. per lb.
Ditto, Small Sizes, for Condensers, &c. ..										1s. 2d. ..

DELIVERY.—London, Liverpool, or Hull.

ANVILS AND VICES.

	Common.	Best.	Warranted.	
Ordinary Shapes, ½ to 5 cwt. ..	26s. 0d.	30s.	33s. 6d.	per cwt.
Best Black Staple Vices ..	37s. 4d.	40s.	44s. 6d.	Side or Double Bick Anvils, 1s. per cwt. extra.
Best Bright ditto ½d. per lb. extra.				

DELIVERY.—London, Liverpool, or Hull.

FERRO-MANGANESE.

		Per ton.	
A Quality, containing 40 to 44 per cent. of Pure Manganese ..		£19	
B " " 45 " 49 " " ..		24	
C " " 50 " 54 " " ..		28	
D " " 55 " 59 " " ..		33	
E " " 60 " 64 " " ..		40	

Packed in cases of 2 cwt. each, and marked with the percentage of Manganese.

DELIVERY.—London, Liverpool, or Hull, in lots of Five Tons.

CAST-STEEL WHEELS,

FOR COLLIERY WAGONS, TRAMWAY CARS, LIGHT RAILWAY WAGONS, &c., see Sheet No. 8.	
Colliery and Tramway Wheels	8 in. to 26 in. diameter .. 36s. 6d. per cwt.
Street Tramway Car Wheels	Weighing about 1 cwt. each .. 43s. 0d. "

DELIVERY.—London, Liverpool, or Hull.

W.M. BIRD AND CO., LONDON,

2, LAURENCE POUNTNEY HILL.

PORTABLE ENGINES.

Nominal Horse-power ..	2½	3½	4	5	6	7	8	10	12	14	16	20	25	30
Single Cylinder	£	£	£	£	£	£	£	£	£	£	£	£	£	£
Double Cylinder	120	150	180	200	220	235	255	295	335	415	455	545	660	780
SEMI-PORTABLE ENGINES.														
Single Cylinder	115	145	175	190	210	225	245	280	320	400	440	530	640	755
Double Cylinder	..	..	..	..	..	..	..	305	355	400	440	530	640	755
Engines with Cylinders Cased ..								£10 each extra.						
Enlarged Fire Boxes, for Burning Wood ..								20s. per Horse-power extra.						
Variable Expansion Gear								20s. to 30s. „ „						
Packing for Shipment								about 20s. „ „						

STRAW-BURNING PORTABLE ENGINES. Special prices on application.

TRACTION ENGINE OR AGRICULTURAL LOCOMOTIVE.

Nominal Horse-power	4	6	8	9	10	12	14
.. .. .	£325	£375	£440	£470	£505	£600	£690
FIRE BOX FOR BURNING WOOD ..	10	10	10	..	15	25	25
PACKING FOR SHIPMENT	8	10	10	..	15	25	25
If with Two Speeds, £10 extra. Compensating Motion, £15 each.							
DELIVERY.—London, Liverpool, or Hull.							

STEAM ROAD ROLLER.

Sheet No. 5 of Album.

Total Width of Rollers	6 feet.	7 feet.	7½ feet.
„ Weight „	10 tons.	15 tons.	20 tons.
Diameter of Rollers	4½ feet.	5 feet.	5½ feet.
PACKING FOR SHIPMENT	£500	£630	£760
.. .. .	15	25	30
If with Spikes fitted to Rollers, for lifting old roads before being re-metalled, £5 extra.			
DELIVERY.—London.			

ROAD LOCOMOTIVE.

Nominal Horse-power	4	6	8	10	12
ROAD LOCOMOTIVE CRANE ENGINE ..	£395	£445	£510	£580	£660
TRAMWAY LOCOMOTIVE, worked by ..	435	505	590	..	..
Gearing, for speed of 3 to 5 miles per hour ..	465	520	600	740	920
FIRE BOX FOR BURNING WOOD, extra ..	10	10	10	15	15
PACKING FOR SHIPMENT, extra	8	10	15	20	25
DELIVERY.—London.					

FIXED ENGINES.

Nominal Horse-power	4	6	8	10	12	14	16	20	25	30	35	40
HORIZONTAL ENGINES	£75	£100	£125	£150	£173	£195	£220	£272	£328	£385	£440	£500
IF WITH BOILER	150	200	250	300	346	390	440	544	756	770	880	1000
VARIABLE EXPANSION GEAR, 25/0 per Horse-power extra.												
FEED-WATER HEATER, £10 to £20 extra, according to size.												
Nominal Horse-power	2	2½	3½	4	5	6	7	8	9	10	12	Dble. Cyl. 12
VERTICAL ENGINE } AND BOILER } COMBINED	£90	£110	£121	£130	£135	£175	£200	£215	£235	£250	£290	£315
PACKING FOR SHIPMENT, about 20/0 per Horse-power extra.												
DELIVERY.—London, Liverpool, or Hull.												

WM. BIRD AND CO., LONDON,
2, LAURENCE POUNTNEY HILL.

HORIZONTAL ENGINE,

WITH VERTICAL BOILER ON SAME BED PLATE.

Nominal Horse-power	2	3	4	6	8	10	14
Size of Cylinders	£75 4 × 8	£95 5 × 10	£110 6 × 12	£150 8 × 16	£180 9 × 18	£225 10 × 20	£280 12 × 24 inches.
Approximate Weight	1½	1¾	2½	3½	3¾	4½	5½ tons.

Pulley on Fly-Wheel Shaft extra, according to size.

DELIVERY—At Works. London or Liverpool, about 10 per cent. extra.

PIG IRON,

For Forge or Foundry purposes, supplied at current quotations, which fluctuate from day to day.

SCOTCH BRANDS.—“Almond,” “Calder,” “Carnbroe,” “Carron,” “Coltness,” “Clyde,” “Dalmellington,” “Eglinton,” “Gartsherrie,” “Glengarnock,” “Govan,” “Lugar,” “Kinneil,” “Langloan,” “Lochgelly,” “Monkland,” “Muirkirk,” “Shotts,” “Summerlee,” &c., &c.

NORTH OF ENGLAND BRANDS.—“Acklam,” “Clarence,” “Clay Lane,” “Ferryhill,” “Glaidsdale,” “Gros-mont,” “Hareshaw,” “Linthorpe,” “Normanby,” “Ormesby,” “Ridsdale,” “Southbank,” “Thornaby,” “Weardale,” “Wylam,” &c., &c.

WELSH BRANDS.—“Blænavon,” “Cwm Bran,” “Gadlys,” “Kilgetty,” “Pentynch,” “Pontypool,” “Treforest,” “Trimsaran,” “Yniscedwyn,” “Ystalfera,” &c.

HÆMATITE BRANDS.—“Askam,” “Barrow,” “Cleator,” “Carnforth,” “Harrington,” “Moss Bay,” “Maryport,” “Millom,” “Longdale,” “Solway,” “Wigan,” “Workington,” &c.

SHROPSHIRE BRANDS.—“Lilleshall,” “Madeley Wood,” “Old Park,” &c.

Derbyshire, Forest of Dean, Lincolnshire, Northamptonshire, North Wales, Staffordshire, Yorkshire, or any other Special District Brands.

GENUINE AND IMITATION MILAN STEEL.

SWEDISH IRON AND STEEL.

COPPER, YELLOW METAL, AND BRASS.

SPELTER, ZINC, AND LEAD.

WROUGHT AND CAST IRON GIRDERS, COLUMNS.

CAST-IRON HOLLOW WARE, MALLEABLE CASTINGS, &c.

IRON ROOFS, VERANDAHS, CONSERVATORIES, &c.

FORGINGS IN STEEL AND IRON, CHILLED ROLLS, &c.

SPADES, SHOVELS, PLATELAYERS' TOOLS.

IRON, STEEL, AND HEMP ROPES.

LANCASHIRE, BIRMINGHAM, AND SHEFFIELD LIGHT AND HEAVY EDGE AND OTHER TOOLS.

CANNON, SHOT, SHELL, AND OTHER PROJECTILES.

BLASTING POWDER, DYNAMITE, SAFETY FUSE, &c.

MACHINE TOOLS OF EVERY DESCRIPTION.

Planing, Shaping, Slotting, Drilling and Boring, Punching and Shearing, Plate-Bending Machines, Lathes, Screwing and Tapping, Bolt, Nut, and Rivet Making, and Riveting Machines.

HYDRAULIC CRANES AND MACHINERY.

STEAM HAMMERS, FORGE AND FOUNDRY TOOLS.

WOOD WORKING MACHINERY.

BRICK AND TILE MACHINERY, PEAT COMPRESSORS.

AGRICULTURAL MACHINERY, CARTS, WAGONS, &c.

WATER WHEELS, TURBINES, &c.

PILE DRIVING APPARATUS, PILE SHOES.

HAND AND STEAM FIRE ENGINES, PUMPS, &c.

STONE AND SLATE CUTTING MACHINERY.

SUGAR-CANE MILLS AND MACHINERY.

COFFEE AND RICE MACHINERY.

HYDRAULIC PRESSES FOR COTTON, WOOL, &c.

SPINNING AND WEAVING MACHINERY.

PORTABLE RAILWAY FOR FARMS, &c.

STEAM AND ORDINARY DREDGERS.

STEAM SHIPS, TUGS, IRON CARGO BOLTS, &c.

WM. BIRD AND CO. undertake the Purchase, Inspection, and Shipment of every kind of Railway, Mining, and Manufacturing Plant, Stores, &c. Their Firm has been established about forty-five years, and exclusively in connection with Iron, Metals, Machinery, &c.

WM. BIRD AND CO., LONDON,

2, LAURENCE POUNTNEY HILL.

R. ADAMS,
ENGINEER, AND PATENTEE
OF THE
"CONVERGING AND REGULATING SPRING HINGE AND
ADJUSTABLE SHOE,"

FOR DOUBLE-ACTION AND REBATE-FRAMED DOORS.

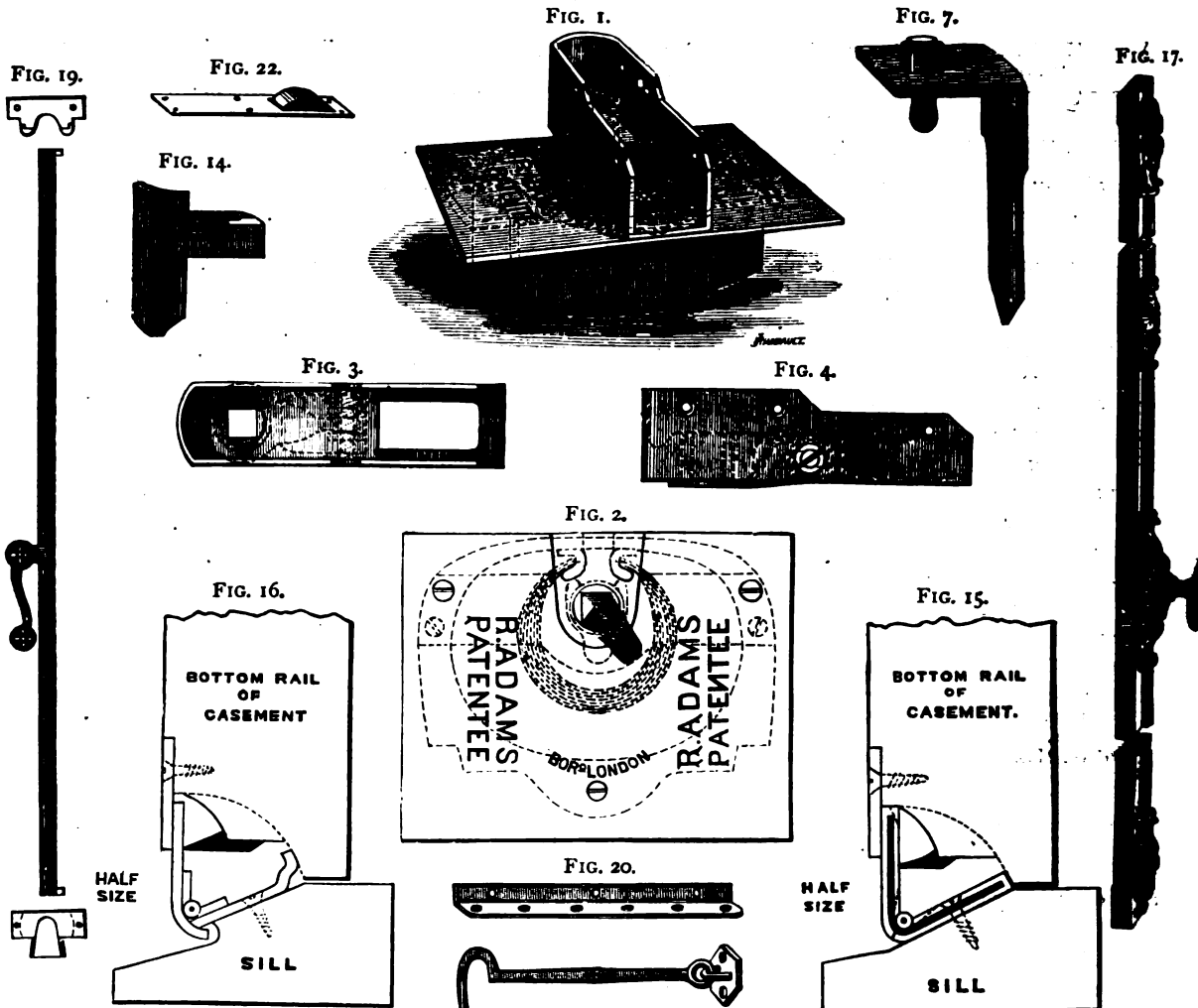
WEATHER-TIGHT SILL BARS and TRIPLE-ACTION BOLTS for FRENCH CASEMENTS, &c.

Builders supplied with all kinds of modern and most approved Machinery.

LIFTS FOR HOTELS, IRON DOORS FOR STRONG ROOMS,
AND ALL KINDS OF IRON AND BRASS WORK TO ORDER.

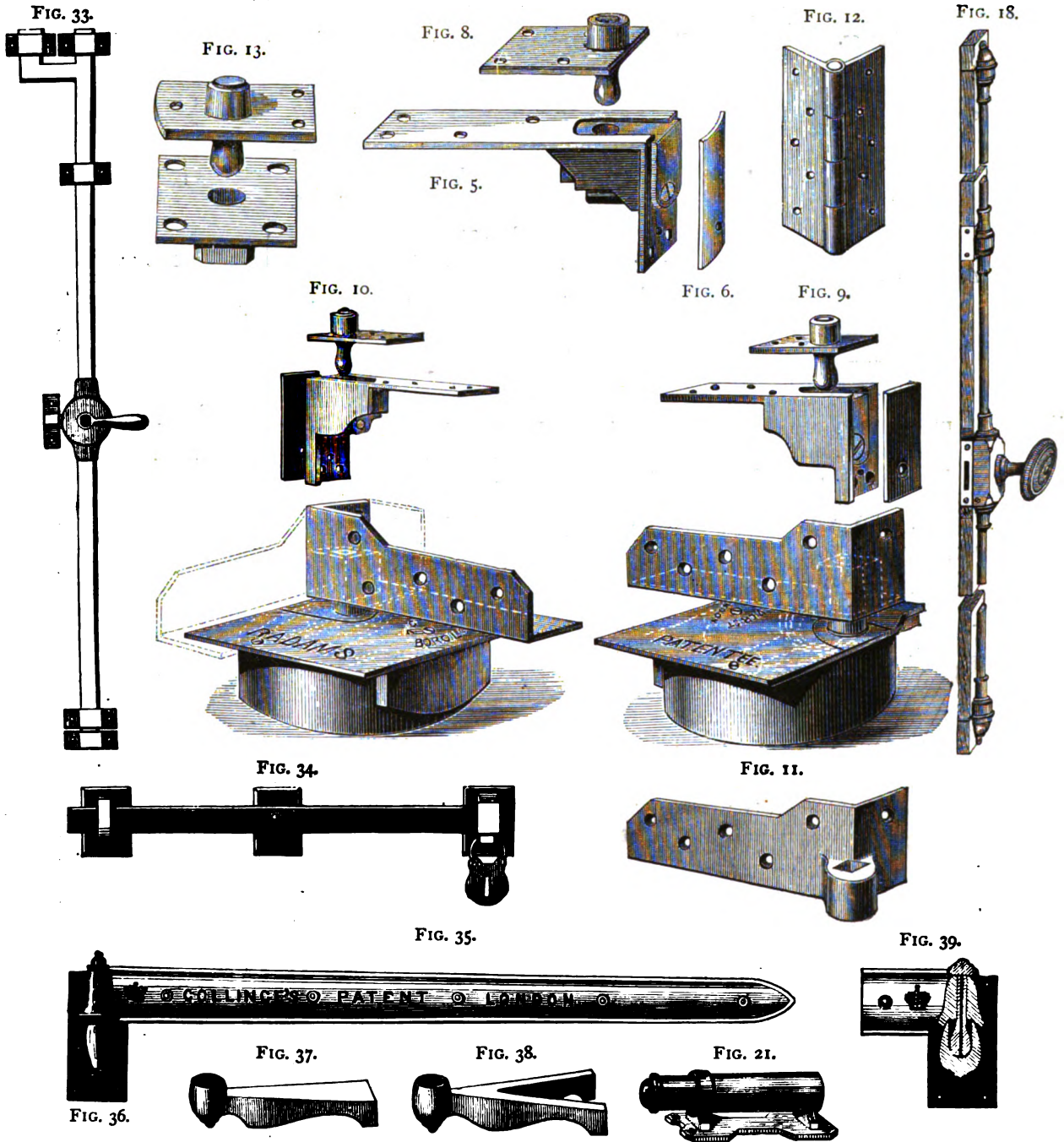
The particular attention of Architects, Builders, the Trade, Shippers, and the Public, is invited to the remarkable features of this Spring Hinge, &c. (as described on p. 383), which, through the introduction of recent patented important improvements, possesses all the advantages so long desired.

For Prices and explanation of Figures, see pages 382 and 383.



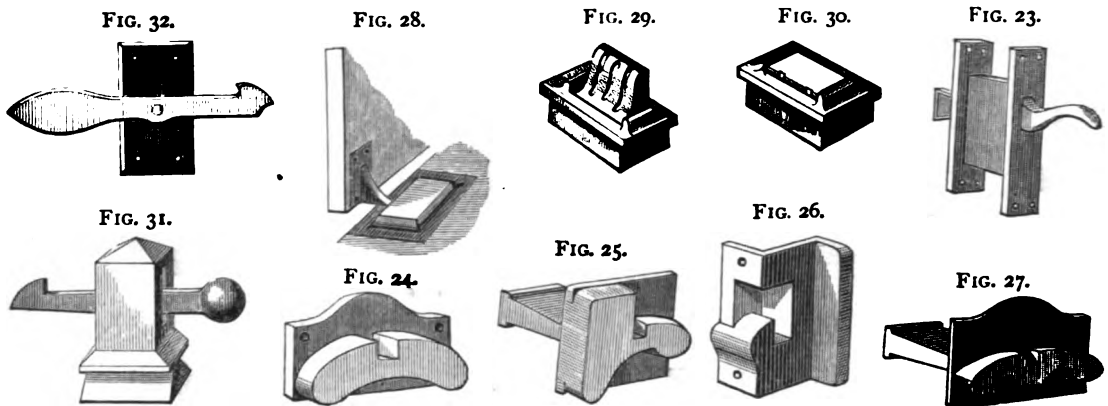
WORKS: 7, GREAT DOVER STREET, BOROUGH, LONDON, S.E.

PATENT SPRING AND OTHER HINGES, DOOR AND GATE FITTINGS.



Manufacturer of COLLINGE'S Patent Spherical and other Hinges, and all kinds of Gate and Door Fastenings.

R. ADAMS,
ENGINEER, 7, GREAT DOVER STREET, BOROUG, LONDON, S.E.
REMOVED FROM 25, FALMOUTH ROAD.

DOOR AND GATE FITTINGS—*continued.*

Explanation and Prices of Illustrated Articles.

- Figs. 1 and 2. Perspective and Sectional Plan of R. Adams' Improved Patent Regulating Spring Hinge.
 Figs. 3 and 4. Sectional Side View and Plan of R. Adams' Improved Patent Adjustable Shoe.
 Figs. 5 and 6. Adjustable Top Centre, with Sliding Step, for Swing Doors. (A very great advantage.)
 Figs. 7 and 8. Bracket and Ordinary Top Centre Pin-Holder, for Dwarf and Ordinary Entrance Doors.
 Figs. 9 and 10. R. Adams' Patent Right and Left Hand Single-Action Spring Hinge and Adjusting Top Centre, for Public-House and other Doors. From 15s. each, advancing 6d. every $\frac{1}{4}$ inch from 1 inch.
 Figs. 11 and 12. Right-Hand Knuckle Shoe and Butt Hinge Top Centre, for Rebated Door Spring Hinge.
 Figs. 13 and 14. Bottom Centre, and Top or Intermediate Centre, for Gothic Swing or Heavy Doors.
 Figs. 15 and 16. R. Adams and Smith's Patent Water Bars for French Casement Sills. R. A.s' is designed to allow of being stepped on without injuring it, requires no preparation of the sill for fixing, and is air-tight. 18-in., 11s. 6d.; 24-in., 13s. 3d.; 36-in., 18s.; 48-in., 22s.; 60-in., 25s.; 72-in., 26s. 6d.
 Figs. 17 and 18. R. Adams' Patent Ornamental and Plain Triple-Action Casement Bolts; shoots up, down, and across, 31s. 6d. Six feet long, Double Action, 28s. 6d. These prevent Casements winding.
 Figs. 19 and 20. Espagnolette Bolt, $\frac{3}{4}$, 3s. 4d.; $\frac{1}{2}$, 4s.; $\frac{1}{4}$, 4s. 9d., commencing at 5 feet. Fig. 20 is an Octagon-Pattern Hook and Set Stay for Casements. 3s. 9d. each. Other patterns to order.
 Figs. 21 and 22. Door Buffer and Porter Door Stop, for Bank or other Doors, to counteract violence.
 Figs. 23 to 27. Latch and Catches for Single and Double Action Park Gate, for Wood or Stone Piers.
 Figs. 28 to 30. Self-Acting Fall-down Stop, raised by Iron Lift on Door. Fig. 29, door open; 12s. each.
 Figs. 31 and 32. Ball Catches for Park or other Gates. To let into ground, 12s. To screw on wood, 10s.
 Figs. 33 and 34. Lever Bolt; shoots three ways, up, down, and across. 50s. each. Brass Cases to order.
 Fig. 34 is a Swing Bar with Padlock. Price 26s. Lock not included. Supplied to order.
 Figs. 35 to 39. Collinge's Patent Spherical Strap Hinges and Steps for Wood, Stone, or Brick Piers. These hinges are made cranked or ramped to order, for Gothic or Arched Doors.

IMPROVED MORTISING AND PLANING MACHINERY.

LATHES, DRILLING, PUNCHING MACHINES, VICES, AND ALL KINDS OF TOOLS.

Prices on application.

CERTIFICATE OF MERIT AWARDED FROM THE INTERNATIONAL EXHIBITION OF 1872.

OPINIONS OF THE PRESS ON APPLICATION TO THE PATENTEE.

R. ADAMS,

ENGINEER, 7, GREAT DOVER STREET, BOROUGH, LONDON, S.E.

REMOVED FROM 25, FALMOUTH ROAD.

Advantages and Prices of R. Adams' Improved Patent Adjustable Shoe and Regulating Spring Hinge and Fittings.

1. All the working bearings are steel faced, and having but little friction will endure great wear.
2. No slackness arises from wear, as the Spring is compensating, having direct action on the axis.
3. Its extreme simplicity prevents derangements and renders it easily understood.
4. The Spring has great power over the door when closed, but its resistance diminishes in opening.
5. Its strength can be easily regulated to suit doors of any dimensions by an ordinary workman.
6. This Hinge Box is fixed without screws; two wedges of hard wood only are required.
7. Turning the set screw in the New Patent Shoe to the right or left, the door is thereby instantly and accurately adjusted to its centre, although the Hinge may be unskilfully fixed. (A great time saver.)
8. Its compactness will commend itself to all who object to cutting larger holes in the sill.
9. The adjustable top centre regulates the door when from wear it has dropped forward.
10. It possesses more advantages while its cost is more moderate than any other warranted Spring Hinge.

		No. 1.	No. 2. Best.
For ordinary Entrance Office or Dwarf Door, with Top Centre (Steel Faced), from 1 to 1½		17s. 6d. and 24s. 6d. each.	
Ditto, with Patent Adjustable Shoe and Regulating Top Centre.	1½ 2½	27s. 6d.	31s. 6d.
For Extra-Heavy Doors	2½ 3	37s. 6d.	42s. 6d.

Or fitted with the Ordinary Shoe, from 1½ inch, 2s. each less.

Shoe patterns vary every ⅙ of an inch. A Template is necessary for Mahogany Doors of special thickness.

Hinges for ordinary Doors always in Stock, and may also be obtained of all the principal Ironmongers.

CERTIFICATE OF MERIT AWARDED FROM THE INTERNATIONAL EXHIBITION OF 1872.

OPINIONS OF THE PRESS ON APPLICATION TO THE PATENTEE.

Price and Particulars of Collinge's Patent Spherical Gate or Strap Hinges.

Collinge's Patent Spherical Hinge is fitted with a ball-shaped pin, and the step or hook, which is chill cast, forms a cup for its reception: this arrangement permits of considerable obliquity in the axis of the hinge, and allows for all ordinary variation, without losing the smooth and easy action of the hinge. The cup forming a bearing for the ball furnishes a receptacle for oil, and being covered with the lip of the knuckle, moisture and dirt are excluded.

R. A. is enabled to offer these elegant and superior Hinges at prices which will bring them within the reach of Builders for almost all work requiring strap hinges.

Per Pair.			Per Pair.			Per Pair.			Per Pair.			Per Pair.			Per Pair.		
ft. in.	s.	d.	ft. in.	s.	d.	ft. in.	s.	d.	ft. in.	s.	d.	ft. in.	s.	d.	ft. in.	s.	d.
1 6	7	0	2 6	13	0	3 6	20	0	4 6	26	0	5 6	33	0	6 6	39	0
1 9	8	6	2 9	14	6	3 9	21	6	4 9	27	6	5 9	34	6	6 9	40	6
2 0	10	0	3 0	16	0	4 0	23	0	5 0	29	0	6 0	36	0	7 0	42	0
2 3	11	6	3 3	17	6	4 3	24	6	5 3	30	6	6 3	37	6	7 6	45	0

1s. extra per pair for Stone Steps. Bolts 7d. each.

NOTE.—For Single or Odd Pairs of Hinges or Butts, the *hand* should be stated according to the following:—"The knuckle of the *Right*-hand Hinge or Butt is on the *Right* of one opening the gate or door towards him."

In ordering, please state whether the Hinges are to be hung to *Wood* Posts, or to *Stone* or *Brick* Piers; also the *thickness* of *Gates*, to determine length of bolts.

Collinge's Patent Double Strap Hinges, Self Closing, for Park or Field Gates, 20s. per pair per foot.

Ornamental ditto to order. Prices on application.

Liberal Discount allowed to the Trade, on receipt of card, on all the above goods.

R. ADAMS,

ENGINEER, 7, GREAT DOVER STREET, BOROUGH, LONDON, S.E.

REMOVED FROM 25, FALMOUTH ROAD.

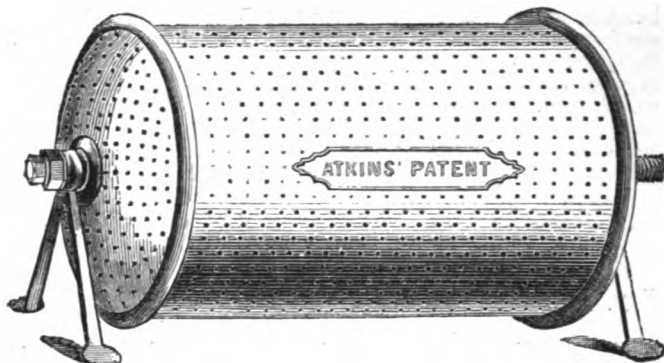
ATKINS'S PATENT CISTERN FILTER

As adopted by H.M. Government for the Royal Navy, Military Stores and Barracks, Indian State Railways, Ashantee Expedition, Lighthouses, &c., &c.

Easily cleaned.

Thoroughly
effective.

Easily applied.



The only
Cistern Filter
which really
removes
organic matter,
iron, lime, lead,
&c., &c.

FROM 'THE TIMES,' NOVEMBER 28, 1873.

(NAVAL AND MILITARY INTELLIGENCE.)

"The Marine Society's Training Ship 'Warspite,' Capt. Phipps, R.N., off the Dockyard, Woolwich, and the Training Ship 'Goliath,' Capt. W. S. Bourchier, R.N., have just been furnished with tank filters by Atkins and Co., of Fleet Street, similar to those supplied to ships belonging to Her Majesty's Navy and Hospital Ships, by the use of which pure soft and wholesome water for drinking or cooking purposes can always be obtained. They consist of an earthenware or galvanized iron hollow cylinder, with movable caps to facilitate cleansing, and are fitted with carbon blocks of animal charcoal, surrounded by loose charcoal to effect a rough filtration first, through which the water passes to the central pipe, and from which water can be drawn at any time. The filters are supported on legs to keep them out of the sediment, which naturally falls to the bottom of the cistern, and all the fittings are of galvanized iron."

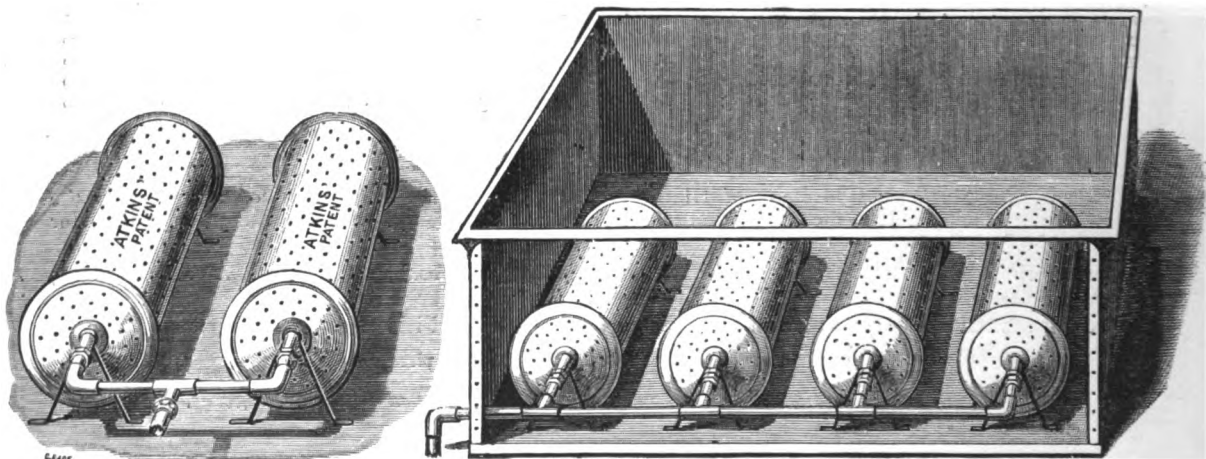
PRICES OF SINGLE CISTERN FILTERS, Adapted to supply Single Drinking Taps.

No. 1. Small size, supplies one $\frac{3}{4}$ in. draw-off Tap	£3 0	Length, including Unions, &c., 24 in., dia. 11 in.
2. " " " " " " " " " " " " " " " "	4 0	" " " " " " " " " " " "
3. Medium " " " " " " " " " " " " " " " "	5 5	" " " " " " " " " " " "
4. " " " " " " " " " " " " " " " "	7 10	" " " " " " " " " " " "
5. Large size " " " " " " " " " " " " " " " "	9 10	" " " " " " " " " " " "

Where it is required to supply several taps, the Filters are used in sets as below.

ATKINS'S CISTERN FILTERS IN SETS FOR LARGE SUPPLIES (see below).

FOR FULL PRICES, SEE ATKINS AND CO.'S NEW PAMPHLET, 'The Water Supply to Country Mansions, Town Residences, &c., &c.'—Post Free for Two Stamps.



Set of Two Cistern Filters, connected together.

Set of Four Cistern Filters, fitted to pipe supplying several taps.

F. H. ATKINS AND CO.,

HYDRAULIC AND SANITARY ENGINEERS AND CONTRACTORS TO H.M. GOVERNMENT,
62, FLEET STREET, LONDON, E.C. WORKS: CHEPSTOW, MONMOUTHSHIRE.

FILTERING APPARATUS.

NEW COMPOUND SYSTEM OF FILTRATION (ATKINS'S PATENT),
FOR COUNTRY AND TOWN MANSIONS, PUBLIC INSTITUTIONS, ASYLUMS, HOTELS,
VILLAGES, &c., &c.

See ATKINS AND Co.'s new Pamphlet, 'The Water Supply to Country Residences, Town Mansions, &c., &c.'—Post Free for Two Stamps.

'A NEW PATENT SYSTEM FOR THE FILTRATION OF WATER IN QUANTITY, FOR WATER WORKS, MANUFACTORIES, &c.'—Pamphlet by ATKINS AND Co., Post Free, Two Stamps.

A NEW PATENT SYSTEM FOR SOFTENING WATER, REMOVING CARBONATE AND SULPHATE OF LIME.—Particulars on application.

INCRUSTATION IN STEAM BOILERS entirely prevented by adopting **Atkins and Co.'s System.**

PREVENTION OF INCRUSTATION IN BOILERS.

Col. HUDSON, Superintendent of the Army Clothing Depot, Pimlico, writes as follows :

GENTLEMEN,—In reply to your inquiry respecting the efficient working of the Filters put up by you some three years since in the Government Factory, Pimlico, I beg to inform you they have proved a very great success.

The difficulty we had to contend with prior to their adoption, in using the water furnished by the London companies, as well as that pumped from wells, was that all supplies, though apparently perfectly clear when cold, nevertheless contained a large amount of deposit, and became turbid when at the boiling point, and rapidly formed incrustation in the boilers and supply pipes of the establishment. To such an extent was this incrustation deposited that it frequently became necessary to scale the boilers, and to take down the pipes for the purpose of removing the incrustation, and constant expense and trouble was incurred in so doing. This occurred every six months, and on each occasion the pipes were found to be so stopped up that a pencil could not have been passed through them, and it was necessary to heat them red hot before the deposit could be removed.

The Filtering Apparatus fitted up by you has effectually remedied this difficulty. After using the filtered water for eighteen months, the pipes and boiler were examined and found to be perfectly free from any deposit, and the boiling water at all times remained perfectly clear and remarkably sweet. It has continued so ever since. With regard to the cost of the Filtering Tank and Apparatus, I consider that the expense of putting them up and of cleansing and keeping them in order has been far more than covered by the absence of outlay in taking down and replacing the pipes and scaling the boiler ; and setting aside the advantages, from a sanitary point of view, of having pure and sweet water on all occasions for the use of the establishment, I consider the system of filtration we have carried out to be a very great economy.

See also Messrs. ATKINS' recent Pamphlet :—'Hints to Sanitary Legislators,' a treatise on Sanitary Science.—Post Free, Thirteen Stamps.

F. H. ATKINS AND CO.,

HYDRAULIC AND SANITARY ENGINEERS AND CONTRACTORS TO H.M. GOVERNMENT,

62, FLEET STREET, LONDON, E.C. WORKS: CHEPSTOW, MONMOUTHSHIRE.

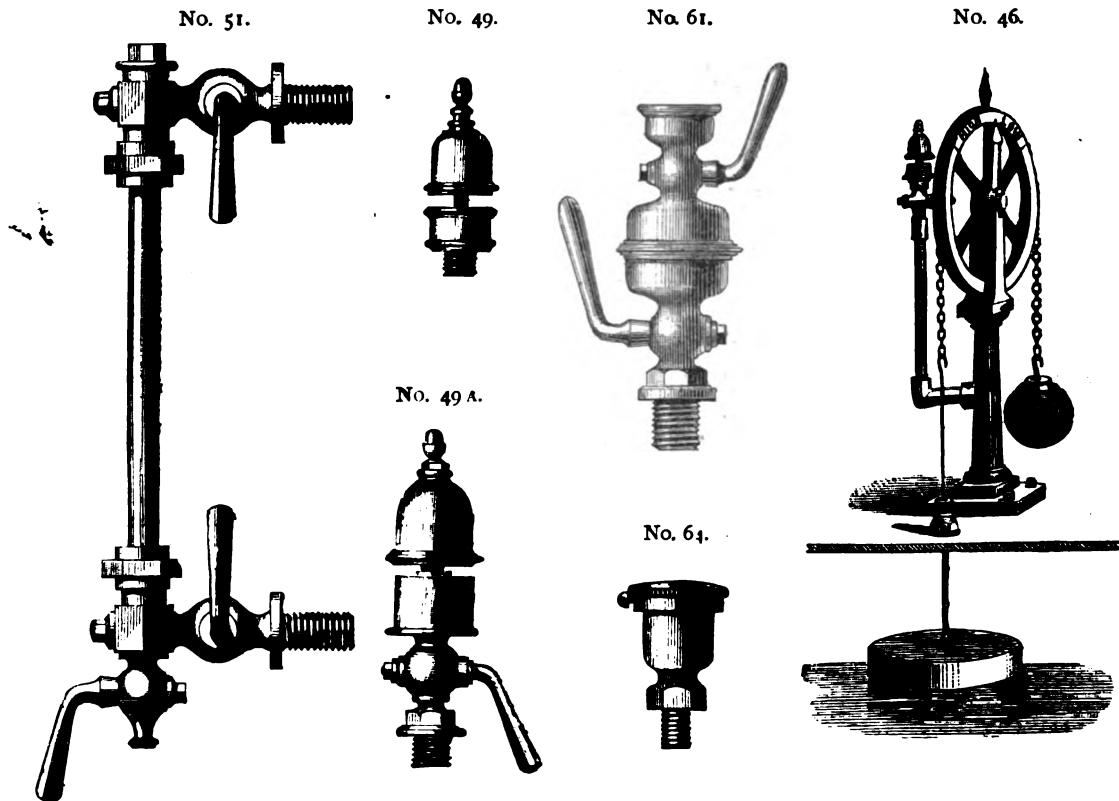
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A. McGLASHAN AND CO., ENGINEERS, MILLWRIGHTS, BRASS AND COCK FOUNDERS, COPPERSMITHS, ETC.,

VICTORIA WORKS, COAL YARD, DRURY LANE, W.C.,

MANUFACTURERS OF BREWING COPPERS, STILLS, AND WORMS, REFRIGERATORS, PUMPS, AND
MASHING MACHINERY,

Distillers', Dyers', Chemists', Tallow Melters', Oil and Stearine Works, and Candle Manufacturers' Utensils and Fittings.



No. 46. IMPROVED SELF-ACTING ALARM WHISTLE, DANGER SIGNAL, AND HIGH AND LOW WATER INDICATOR, Consists of Cast-Iron Standard with Index Point, Brass Plate on Wheel engraved *High* and *Low*, Float Stone, Stuffing Box, Chain and Weight, Gun-Metal Cock and Whistle, Complete, £3 10s.

No. 49. GUN-METAL STEAM WHISTLE, FOR SMALL BOILERS.

1	5/6	3 (Largest Size) ..	7/6	5	11/6
2 (Middle Size) ..	6/6	4	9/6	6	13/0

No. 49 A. GUN-METAL STEAM WHISTLE, WITH COCK AND LEVER FOR SMALL BOILERS.

1	9/6	2	11/6	3	13/6
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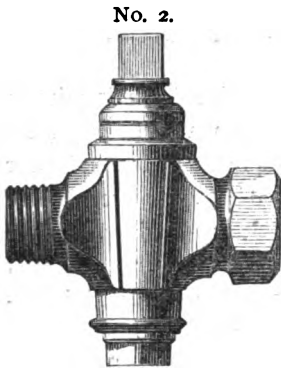
No. 51. GUN-METAL WATER GAUGE, WITH SCREWED SHANKS, FLY NUTS, FIXED METAL SPANNERS, GLASS TUBE, AND VULCANIZED INDIARUBBER RINGS, COMPLETE.

	No. 1. 16/0	No. 2. 21/0	No. 3. 28/0
Ditto, with Ebony Handles	17/6	22/6	30/0

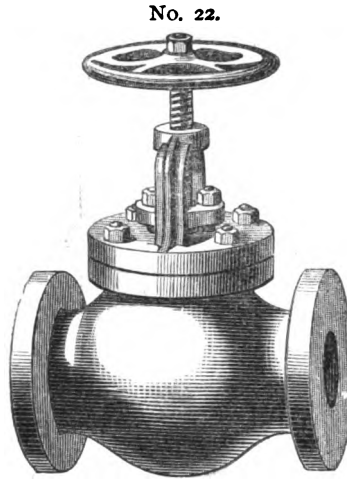
No. 61.—No. 1.	10/0	No. 2.	12/6	No. 3.	15/0
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No. 64. Small Size, 2/6 Large Size, 3/6

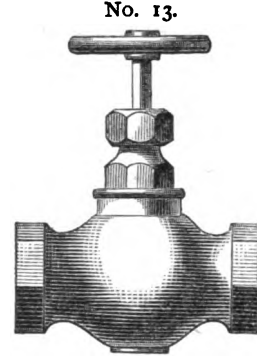
Illustrated Catalogues on application.



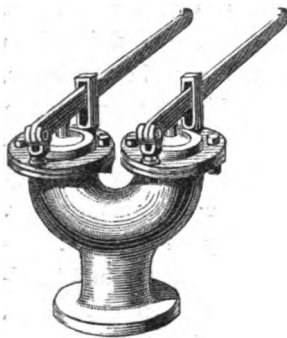
No. 2.



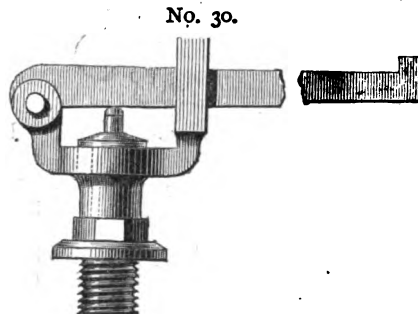
No. 22.



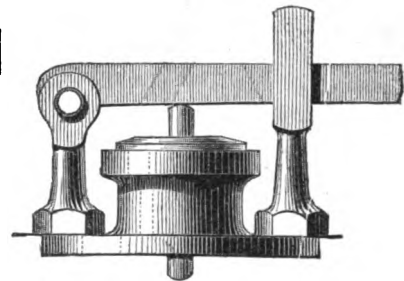
No. 13.



No. 27.



No. 30.



No. 31.

No. 2. GUN-METAL STEAM COCK, WITH MALE AND FEMALE ENDS, SCREWED TO FIT PIPE.

	$\frac{1}{4}$ "	$\frac{3}{8}$ "	$\frac{1}{2}$ "	$\frac{3}{4}$ "	1"	1 $\frac{1}{2}$ "	2"
Bright	2/4	3/0	4/0	5/10	9/0	14/6	20/6
Black	—	—	3/9	5/6	8/6	12/6	19/0

No. 13. GUN-METAL GLOBULAR STEAM VALVE, WITH FEMALE ENDS, SCREWED TO FIT IRON PIPE.

	$\frac{1}{2}$ "	$\frac{3}{4}$ "	1"	1 $\frac{1}{2}$ "	2"
Strong Pattern ..	6/0	7/6	12/0	16/0	21/0
Light „ ..	4/6	6/0	8/6	11/6	15/0

No. 22. CAST-IRON GLOBULAR STEAM VALVE, WITH FLANGE ENDS FOR SUPERHEATED STEAM.

	2"	3"	4"	5"	6"
Best pattern	42/0	63/0	84/0	105/0	120/0

No. 27. CAST-IRON STANDARD, WITH TWO GUN-METAL SAFETY VALVES, AND WROUGHT-IRON LEVERS.

	2"	3"	4"
Hollow Cast-Iron Weights, Extra	50/0	60/0	80/0

No. 30. GUN-METAL SAFETY VALVE, WITH IRON LEVER PASSING THROUGH GUIDE, AND SCREWED TO FIT IRON PIPE.

	$\frac{3}{8}$ "	1"	1 $\frac{1}{2}$ "	2"
	8/6	10/6	14/0	18/0

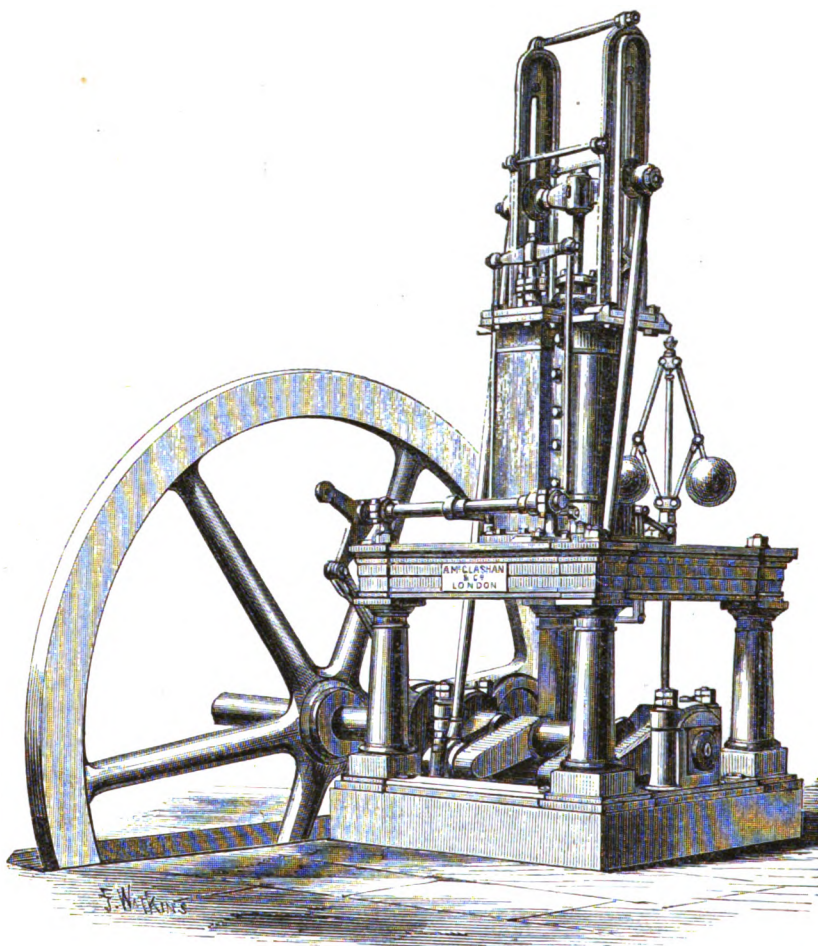
No. 31. GUN-METAL SAFETY VALVE, WITH IRON LEVER PASSING THROUGH GUIDE, AND FLANGED, TO BOLT ON TO STANDARD PIPE ON THE BOILER DIRECT.

	2"	2 $\frac{1}{2}$ "	3"	4"
No. 1.	24/0	33/0	42/0	56/0
2.	28/0	38/0	48/0	63/0
3.	40/0	56/0	60/0	80/0

Illustrated Catalogues on application.

A. McGLASHAN AND CO.,
ENGINEERS, MILLWRIGHTS, BRASS AND COCK FOUNDERS, COPPERSMITHS, &c.,
VICTORIA WORKS, COAL YARD, DRURY LANE, W.C.

IMPROVED VERTICAL, OR TABLE STEAM-ENGINE.



The Engraving, drawn from a photograph, represents one of our 8 horse-power Table Steam-Engines. These Engines are designed and constructed in accordance with the most approved and modern principles of engineering. The various parts are carefully got up, fitted, and finished in the very best manner, and in their construction particular attention has been paid to efficiency and economy in working. They are compact, well-proportioned, and handsome-looking Engines, and when compared with Horizontal Engines they occupy much less space, do their work better, and what is of great consequence, the working parts wear regular; and

it is well known that this is not the case with Horizontal Engines. For all purposes where a moderate amount of power is required (say from 4 to 15 horse-power), they are the best and most economical working Engines.

A. McGlashan and Co. have manufactured and supplied a large number of these Engines to Brewers, Distillers, Builders, Saw Mill Proprietors, Printers, Oil Works, Candle Manufacturers, Chemists, Calendriers, Dyers, and others.

Many of these Engines have been at work twenty years, and with the exception of new gun-metal bearings, and the pistons looked to occasionally, they have had no substantial or other repair done to them.

Each Engine is supplied with a governor, throttle valve, and feed pump.

The power of each Engine is calculated to do its allotted work with steam at 25 lb. to 30 lb. per inch, but if worked with steam at 40 lb. to 50 lb., the Engines are made strong enough to give out 25 to 30 per cent. more power.

A. McGLASHAN AND CO.,
ENGINEERS, MILLWRIGHTS, BRASS AND COCK FOUNDERS, COPPERSMITHS, &c.,
VICTORIA WORKS, COAL YARD, DRURY LANE, W.C.

BOURA'S PATENT COLOUR-EXTRACTOR APPARATUS.

FOR

EXTRACTING COLOURING MATTER FROM DYE-WOOD, COCHINEAL, PERSIAN BERRIES, GALL, BARK, &c.

These Apparatus, 400 being now in use, are well known and highly appreciated by the Firms using them for their good qualities, viz. Simplicity, Cleanliness, Economy of Fuel, and great Saving of Colouring Matter, and give the greatest satisfaction, as they extract more colouring matter in Two Hours than can be done by the old system of boiling in EIGHT HOURS, and the colour is much superior in point of brilliancy.

The saving of colouring matter produced by this Apparatus has been proved to be as follows : From all kinds of Dye-wood, 10 per cent. ; Cochineal, Persian Berries, and Galls, 15 per cent. ; Bark, 25 per cent.

The colouring matter can be extracted at 1, 2, or 3 degrees T., if required.

FIG. 1. SHOWING THE WORKING POSITION.

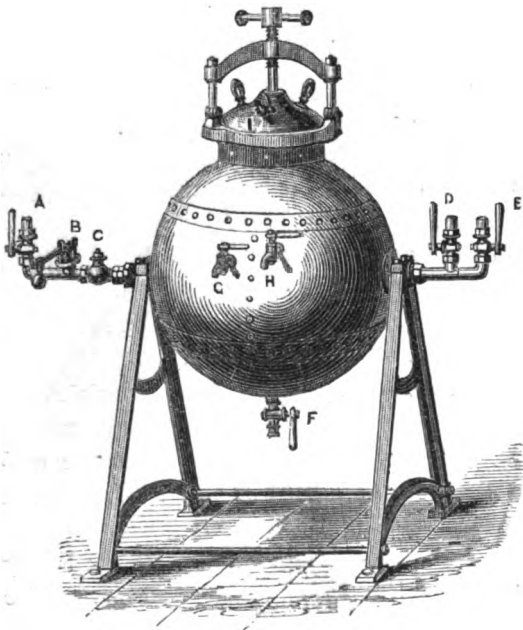
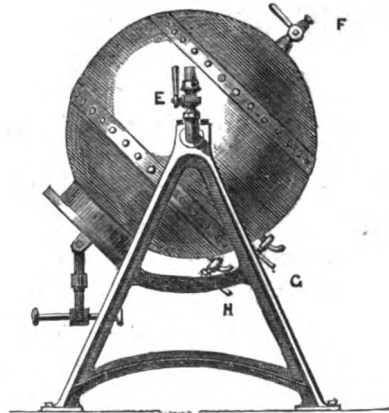


FIG. 2. SHOWING HOW TO TAKE OUT THE WOOD.



A, Steam Cock ; **B**, Safety Valve ; **C**, Check or Back-Pressure Valve ; **D**, Water-Supply Cock ; **E**, Colour-Discharge Cock ; **F**, Washing-out Cock ; **G**, Water-Gauge Cock ; **H**, Steam-Gauge Cock ; **I**, Air and Steam Outlet Cock.

The above Apparatus is made of Copper and Gun Metal, with Gun-Metal Steam Cocks, Union Screws, Safety and Check Valves, and fixed on to Cast-Iron Standards, complete and ready for use.

$\frac{1}{2}$ cwt. . . .	£16	2 cwt. . . .	£42	4 cwt. . . .	£85
1 cwt. . . .	£30	3 cwt. . . .	£65	5 cwt. . . .	£105

Testimonials and Prospectuses on application.

A. McGLASHAN AND CO.,

ENGINEERS, MILLWRIGHTS, BRASS AND COCK FOUNDERS, COPPERSMITHS, &c.,
VICTORIA WORKS, COAL YARD, DRURY LANE, W.C.

THE FIELD BOILER,

OF WHICH UPWARDS OF 1000 ARE NOW WORKING IN ALL PARTS OF THE WORLD, ARE CHEAP, COMPACT, ECONOMICAL, AND THOROUGHLY EFFICIENT FOR ALL PURPOSES.

THE "FIELD" TUBES,

OF WHICH MORE THAN 200,000 HAVE BEEN APPLIED TO BOILERS OF ALL KINDS, ARE CHEAP, EASILY APPLIED (WITHOUT DISTURBING THE BRICKWORK), SAVE FUEL, GIVE INCREASED POWER, PROMOTE CIRCULATION, AND PREVENT LEAKAGE.

The "FIELD" system is largely adopted by the British, Colonial, and principal Foreign Governments, Railway, Steamboat, and Dock Companies, Builders, Brewers, Distillers, Dyers, Engineers, Founders, and Printers; also in Cotton and Paper Mills, Iron, Steel, and Oil Works, Tobacco, Soap, Stearine, and Candle Manufactories; and by many of the most eminent firms, companies, and others, at home and abroad.

ADVANTAGES.

SAFETY.—It is the safest steam generator yet introduced. In the event of shortness of water, the worst that can happen is the burning of some of the tubes, which in fact serve as fusible plugs, so that the fire is extinguished without further damage.

CIRCULATION OF THE WATER.—The circulation of the water in the tubes is absolutely perfect, and is unequalled in any other construction of Boiler.

ECONOMY IN SPACE, WEIGHT, AND FUEL.—An enormous saving of space and weight is effected, and very satisfactory results as regards economy in consumption of fuel are obtained.

DURABILITY, SIMPLICITY, ACCESSIBILITY, AND CHEAPNESS.—Many Boilers on this principle have been in constant use for years without showing the least sign of deterioration. They are perfectly accessible for examination and repair, and as all the working parts are of the most simple construction, the Boilers can be produced ready for work at a very moderate cost, much below that of other descriptions of Boilers, when the saving in brickwork is considered.

ADVANTAGES OF "FIELD" TUBES FOR EXISTING BOILERS.—The "Field" Tubes are largely adopted in Cornish and other Boilers of ordinary construction for increasing their evaporative efficiency and saving fuel.

FACILITY OF FIXING THE TUBES.—The tubes can be readily fixed at small cost, by a very slight expansion of their upper ends, into the thinnest boiler plates, without the employment of any ferrules, bolts, nuts, screws, rivets, or other objectionable contrivance, and without removing the flue of the Boiler, or in any way interfering with the setting.

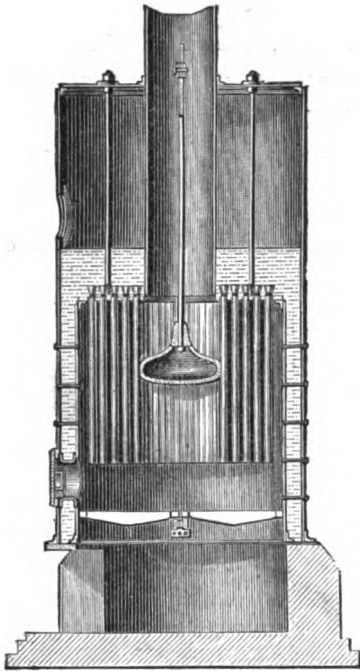
NOTE.—Messrs. Sir W. G. Armstrong and Co., R. and W. Hawthorn, Thompson and Boyd, and Robert Stephenson and Co., in a recent Report, state that "The 'Field' Boiler is easily repaired, safe in construction, and efficient in working."

TESTIMONIALS AND PAMPHLETS ON APPLICATION.

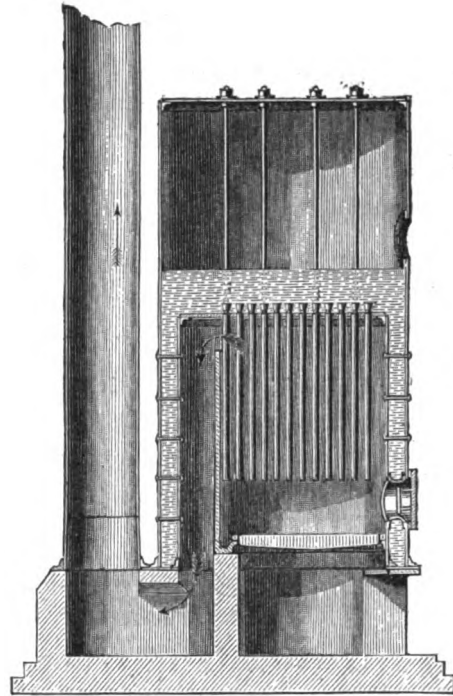
A. McGLASHAN AND CO.,

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VICTORIA WORKS, COAL YARD, DRURY LANE, W.C.

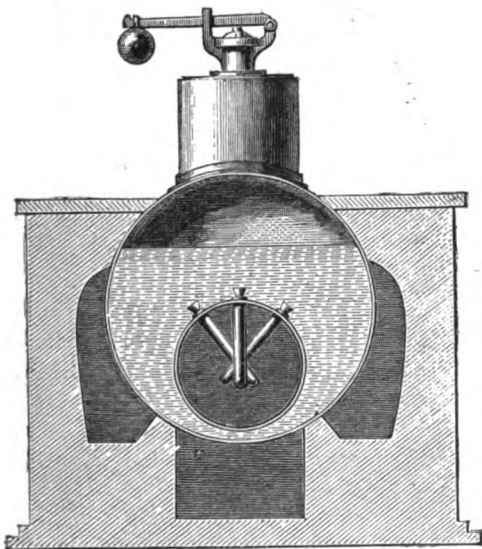
THE "FIELD" BOILER AND TUBES.



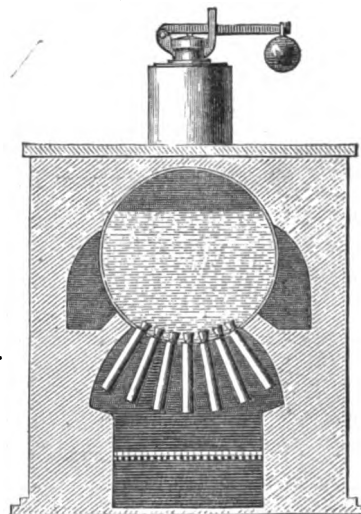
THE "FIELD" BOILER,
WITH CENTRAL UPTAKE.



THE "FIELD" PATENT BOILER,
WITH DOWNDRAUGHT AND FLUE AT SIDE.



CORNISH STEAM BOILER,
WITH SINGLE FURNACE.



CYLINDRICAL, OR EGG-ENDED STEAM BOILER,
FITTED WITH "FIELD" TUBES.

A. McGLASHAN AND CO.,
ENGINEERS, MILLWRIGHTS, BRASS AND COCK FOUNDERS, COPPERSMITHS, &c.,
VICTORIA WORKS, COAL YARD, DRURY LANE, W.C.

CONTRACTORS TO HER MAJESTY'S GOVERNMENT.

TRADE
S.P.
MARK.

LEATHER MACHINE BANDING, LACES, ETC.

The "S.P." Leather, manufactured after the principle of Preller's expired Patent, with those improvements which long experience has suggested, is particularly adapted for Machine Banding, Laces, Rope, &c. It is especially suited for hot climates, and for driving heavy Machinery, as it retains its suppleness when exposed to heat; and its great strength and durability render it cheaper in use than any other.

PRICES FOR "S.P." LEATHER.

MACHINE BANDS, TWICE STRETCHED, SEWN WITH LACES, BUTTS ONLY, NO SHOULDERS USED.

SINGLE.				DOUBLE.			
		s.	d.			s.	d.
1 inch, per foot	.. ..	0	4½	2 inch, per foot	.. ..	2	0
1½	"	0	7	2½	"	2	5
2	"	0	9	3	"	2	10
2½	"	1	1	3½	"	3	4
3	"	1	4	4	"	3	10
3½	"	1	7½	4½	"	4	4
4	"	1	11	5	"	4	8
4½	"	2	2	6	"	5	7
5	"	2	5	7	"	6	9
6	"	3	0	8	"	8	0
7	"	3	7	9	"	9	0
8	"	4	2	10	"	10	2
9	"	4	9	11	"	11	4
10	"	5	3	12	"	12	6

TANNED LEATHER BANDS AT THE SAME PRICES.

LACES.

				SEWING.		LASHING.	
				s.	d.	s.	d.
1½ feet long, per gross	.. ..	6	0	....		6	0
2	"	9	0	....		9	0
2½	"	13	6	....		13	6
3	"	18	0	....		22	0
3½	"	24	0	....		29	0
4	"	30	0	....		36	0
4½	"	36	0	....		44	0
5	"	44	0	....		54	0
5½	"	54	0	....		64	0
6	"	66	0	....		76	0

N.B.—Laces supplied in ANY quantities at the above Prices.

ROPE, per lb. 2s. 6d. to 3s. 6d.

TWISTED LEATHER, at per foot, according to size, being a substitute for Cat-gut.

STEVENS, PELLATT, AND CO.,

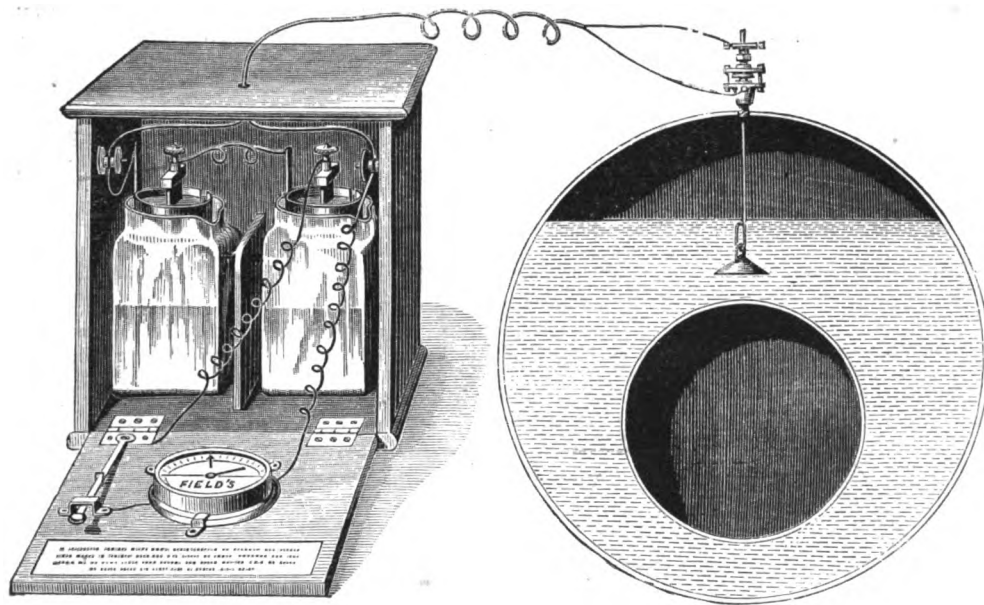
69 AND 70, TOOLEY STREET. CITY OFFICES: 51, KING WILLIAM STREET.

BY ROYAL



LETTERS PATENT.

FIELD'S PATENT GALVANIC BOILER SCALE PREVENTER.



PERSPECTIVE VIEW OF CASE CONTAINING GALVANIC BATTERY AND CONNECTIONS WITH BOILER.
 SIZE OF CASE WHEN CLOSED, ABOUT $10\frac{1}{2}$ INCHES WIDE, 9 INCHES DEEP, $12\frac{1}{2}$ INCHES HIGH.

The attention of employers of steam power is invited to a very simple, inexpensive, and *perfectly effectual* means of *preventing the formation of SCALE OR CRUST IN BOILERS*, invented and patented by Mr. EDWARD FIELD, C.E., Assoc. Inst. C.E., M. Inst. M.E., the well-known inventor of the "Field" Boiler.

In the course of a vast number of experiments carried on during many years as to the prevention of SCALE, and after careful testing of the various compounds used for that purpose, Mr. Field found such remedies to be mere palliatives, and that the cause of the solidification of the precipitated matter remained to be discovered and removed.

It is known that there exists naturally an electrical current in Boilers, or in other words, that *every Boiler* when charged with water and under steam, constitutes an electric battery developing a current of electricity; and thus the iron plates of the Boiler are in such an electrical condition as to favour, or rather to *invite*, the deposit and adhesion of solid matter. Mr. FIELD, therefore, devised means whereby this current should be reversed, and found that during the time his apparatus was used, not only had no new deposit formed on the Boiler, but that SCALE which previously existed was being removed.

An eminent authority on Steam Boilers, writing on the subject of incrustation, remarks: "One of the greatest, and at the same time, one of the most frequent difficulties steam users have to contend with, is the formation of deposit and incrustation, or, as it is also called, scurf, scale, or fur, in their Boilers. Incrustation becomes a source, not only of annoyance and wasteful expenditure of fuel, but also of *actual danger from explosion*, and tends greatly to shorten the life of the Boiler."

The advantages attending the use of "FIELD'S Patent Galvanic Boiler Scale Preventer" are as follows:

- 1st. The apparatus is simple, not liable to get out of order, and when once fixed is continuous in its action.
- 2nd. It produces no injurious effect on the Boiler, such as results from some of the chemical compounds now in use.
- 3rd. The Boilers so protected never require to be stopped for chipping.
- 4th. The whole heating surface of the Boiler being perfectly clean, its evaporative capability is always at its maximum, an average gain of at least 15 per cent. over an encrusted Boiler.
- 5th. The danger of explosion is materially lessened, as the plates, being clean, are not overheated or burned.
- 6th. The Boiler being clean, any defects are at once apparent.
- 7th. It is certain in its action with all kinds of water.
- 8th. The expense of thus perfectly protecting a Boiler from SCALE is far less than that of palliative chemical salts, saying nothing of the avoidance of loss of time and the injury done to the Boiler by chipping.

W. L. THOMPSON AND CO.,

OFFICES: 11, QUEEN VICTORIA STREET, LONDON, E.C.

FIELD'S Galvanic Scale Preventer is confidently recommended to all users of Steam Boilers and Water Heaters as the most certain and inexpensive mode of preventing SCALE.

The apparatus is forwarded complete, with full instructions for fixing (which can be done by any engineer or fitter in about two hours). In forwarding orders, please state, in each case, description of Boiler, the distance between the *top* of the Boiler and the low-water line, depth of water over tubes or plate, also the distance from the Boiler to the place where the apparatus will be situated, as if you were measuring for bell wire.

The apparatus should be kept in the Engine House, or Engineer's room or office.

TESTIMONIALS.

SIR,

LAMBETH UPPER MARSH, LONDON, S.,
10th July, 1873.

During the two years or so that Mr. FIELD'S Galvanic Apparatus has been tried on our boilers, it has *perfectly* fulfilled its object in *preventing the formation of Scale*.

Yours truly,

J. C. & J. FIELD.

[Messrs. J. C. & J. Field have since ordered the whole of their Boilers (twelve in number) to be fitted with this Apparatus].

BATTERSEA WORKS, 20th January, 1874.

Since I last wrote you respecting the working of Mr. E. FIELD'S Galvanic Boiler Scale Preventer, I have had the new Boiler, to which the apparatus was attached, opened and carefully examined, and am pleased to report that, after five months' continuous work, *double time*, there is merely a thin film of Scale, despite the fact that the Boiler was at work eight days and nights before the apparatus was applied.

Yours truly,

ARTHUR SMITH.

DEAR SIR,

VICTORIA WORKS, COAL YARD, DRURY LANE, LONDON, W.C.,
24th October, 1873.

In answer to your inquiry respecting the action of FIELD'S Patent Boiler Scale Preventer, we are pleased to tell you that it has fully answered our expectations; the Boiler did not require cleaning when last opened, after four months' continuous work; under ordinary circumstances the Scale would have been about $\frac{1}{2}$ inch thick.

We are, dear Sir, yours respectfully,

For A. McGLASHAN & CO., (J. D.)

SIR,

GLASS AND PICTURE FRAME MANUFACTORY, 47 $\frac{1}{2}$, ARLINGTON STREET, ISLINGTON, N.
13th April, 1874.

Enclosed is cheque for the FIELD'S Patent Boiler Scale Preventer you put up for us, which gives great satisfaction. No doubt, if it was only known, you would be able to dispose of thousands.

Yours truly,

ROLFE & HARRIS.

DEAR SIR,

ENGINE WORKS, MANSFIELD WHARF, LEICESTER,
23rd April, 1874.

In answer to your inquiries respecting FIELD'S Patent Scale Preventer, I am glad to be able to say that it has given great satisfaction. Before attaching the apparatus, I had a portion of the plate cleaned, and on opening the Boiler after the apparatus had been at work twelve weeks, I found no incrustation whatever, but a great deal of old Scale was being removed. For twelve months previous to Christmas I had been using a Boiler Fluid, which cost me £3 14s. per quarter of thirteen weeks. I find your apparatus has cost about 2s., and does the work most effectually.

I am, dear Sir, yours obediently,

C. LINFORD.

DEAR SIR,

SAW MILLS, 33, WHARF ROAD, CITY ROAD, LONDON, N.,
3rd June, 1874.

Having tried FIELD'S Scale Preventer for six months, I have found it to answer thoroughly well, and would recommend all persons using same for their Boilers. Since using this apparatus, I have found a saving of fully 20 per cent. in coal.

Yours truly,

H. ATKINSON.

DEAR SIR,

ABBEY MILLS, WEST HAM, E.,
19th June, 1874.

We have much pleasure in bearing testimony to the efficiency of FIELD'S Boiler Scale Preventer. The appearance of our Boiler after five months' working, shows not only that no further incrustation has taken place, but also that the old incrustation is rapidly disappearing. It is in every way satisfactory.

We are, dear Sir, your obedient servants,

WM. GOODACRE & CO.

W. L. THOMPSON AND CO.,

OFFICES: 11, QUEEN VICTORIA STREET, LONDON, E.C.

DEAR SIR,

We have the pleasure to inform you that the Scale Preventer affixed to the Boilers at our Lambeth Fire Engine Factory is a perfect success. They were examined at Whitsuntide, and were found to be entirely free from any deposit whatever.

We are, dear Sir, yours faithfully,

MERRYWEATHER & SONS.

67, LONG ACRE, LONDON, W.C.,

18th June, 1874.

DEAR SIR,

I have examined the Boiler to which I applied Mr. FIELD'S Patent Galvanic Scale Preventer in February last, and find the original Scale, which was too hard to chip off, can be picked off with the finger where it has not shelled off already. The result is a great saving in coal.

Yours truly,

JAMES FRANCK.

CHENIS IRON-WORKS, near RICKMANSWORTH,

17th July, 1874.

GENTLEMEN,

We have applied one of the Patent "Galvanic Scale Preventers," invented by Mr. E. FIELD, C.E., to our Boiler, which is one of Messrs. W. and J. Galloway's Patent Boilers, made entirely of steel; the Boiler was thickly incrustated when the Preventer was applied, and on examination five weeks afterwards the whole of the Scale had been removed, and the plates were quite free from deposit. We have continued the use of the apparatus with a result quite satisfactory to ourselves, and have also recommended it to several of our friends.

We are, Gentlemen, yours truly,

POLLOCK & POLLOCK.

LONGCLOSE WORKS, NEWTON, LEEDS,

2nd March, 1875.

DEAR SIR,

We are in receipt of yours of the 8th instant. We have pleasure in informing you that the Galvanic Scale Preventer, which we have had in use at Almond Iron-Works for about six months, has given us entire satisfaction. It *completely prevents* any crust from forming on the plates of the Boiler.

Yours truly,

JAMES RUSSEL & SONS,

Per HENRY AITKEN.

Messrs. E. Bennis & Co.

P.S.—Please send us two more Scale Preventers. [This firm now has ten at work].

BLACKBRAES AND BOGHEAD COLLIERY, AND ALMOND IRON-WORKS, FALKIRK,

March 9th, 1875.

From JOHN PRIESTMAN AND CO.

BRADFORD, 1st July, 1875.

In answer to your inquiry respecting the Scale Preventer, we have much pleasure in saying that they appear to be answering *well*. There has been no fresh incrustation, and that which was on previously is coming off gradually. We beg to forward you cheque for £75 18s., in settlement of account.

[N.B.—This firm has six at work].

MEDOMSLEY EDGE COLLIERY, by NEWCASTLE-ON-TYNE,

14th of 6th Mo., 1875.

DEAR FRIENDS,

The Scale Preventer which I purchased from you *answers very well*. For several weeks it did not appear to do much good; the water is very bad, and the boiler had been much "furred" before we began to use your apparatus. Now we find that the Scale does not crystallize as it did to the inside of the boiler, but falls as dirt to the bottom, and is removed by frequent sludging, so that I am *much pleased* with the results, and regard the apparatus as a great boon where pure water cannot be procured.

I remain, your sincere friend,

EDWIN O. TREGELLES.

BLACKBRAES AND BOGHEAD COLLIERIES, AND ALMOND IRON-WORKS, FALKIRK,

16th June, 1875.

DEAR SIR,

Yours of yesterday. If the Scale Preventers you refer to are those sold by E. BENNIS & Co., I reply *that they are THE THING—no doubt about it*; at least, for such water as we have at Almond *they are perfect*.

Yours truly,

HENRY AITKEN.

B. M. Macrae, Esq., Gas Works, Dundee.

[N.B.—This firm has ten at work].

THE BRITISH GASLIGHT COMPANY, LIMITED, NORWICH,

14th August, 1875.

GENTLEMEN,

In reply to your inquiry, I beg to inform you that one of our boilers fitted with "FIELD'S Patent Galvanic Scale Preventer" was blown off on the 2nd inst., having been at work without intermission since 15th June, a period of 1152 hours, equal to about twenty weeks' factory work. The boiler is about fourteen years old, but I found no symptom of Scale in it, and it was only necessary to scrub it over with a broom to remove a slight coating of dust. I consider the apparatus is entirely successful.

And am, Gentlemen, yours truly,

C. TADMAN, MANAGER.

W. L. THOMPSON AND CO.,

OFFICES: 11, QUEEN VICTORIA STREET, LONDON, E.C.

W. L. THOMPSON AND CO.,
*Manufacturers and Contractors for the application of Non-conducting
 Coverings on Steam Boilers, Cylinders and Pipes,*

AND STEAM SURFACES OF EVERY DESCRIPTION,
 FOR PREVENTING THE RADIATION OF HEAT, EFFECTING A GREAT SAVING IN CONSUMPTION OF FUEL,
 AND A CORRESPONDING INCREASE IN STEAM POWER,

AS SUPPLIED

**To the Royal
 Arsenal, Woolwich,**



**And the Metropolitan
 Board of Works.**

This Composition is proved, by experience, to be the MOST effective and durable yet produced ; and is the MOST perfect Non-conductor of Heat now manufactured. It forms a fine, hard, smooth surface, and, if desired, can be painted or tarred, thus making it IMPERVIOUS TO WEATHER FOR OUTSIDE WORK.

IT POSSESSES THE FOLLOWING ADVANTAGES:

It is SELF-ADHESIVE, WILL NOT COMMUNICATE FIRE, and is NON-CORROSIVE.

It expands and contracts with the metal covered, and DOES NOT CRACK OR PEEL OFF, nor is it friable ; it will not take fire or perish, though in contact with a high degree of heat, and does not cause ANY INJURY to the Boiler Plates, being free from ALL CORROSIVE elements.

It forms a DURABLE and PERMANENT COVERING.

It has now been in use some years, and exhibits no signs of decay ; although, in many cases, it is applied to Boilers working very high pressures, and will stand rough usage. LEAKAGE IS DETECTED immediately by the softening of the composition. In this respect it is SUPERIOR to FELT and many other coverings, as the parts affected can have the composition taken off and re-applied, making the surface sound and good.

The Composition can be supplied in Casks (mixed) all ready for use. Price £ per Ton, delivered at a London Railway Station or Wharf. A Ton of the Composition in state as sent will cover 200 square feet 1½ inch thick, which is sufficient for most purposes.

BOILERS, CYLINDERS, PIPES, &c., &c., COVERED COMPLETE BY COMPETENT WORKMEN in a neat and substantial manner, at a price per superficial foot. Outside measurement is charged.

**In use at most of the principal Breweries, Sugar Refineries, &c., &c., and
 highly recommended by leading Engineers.**

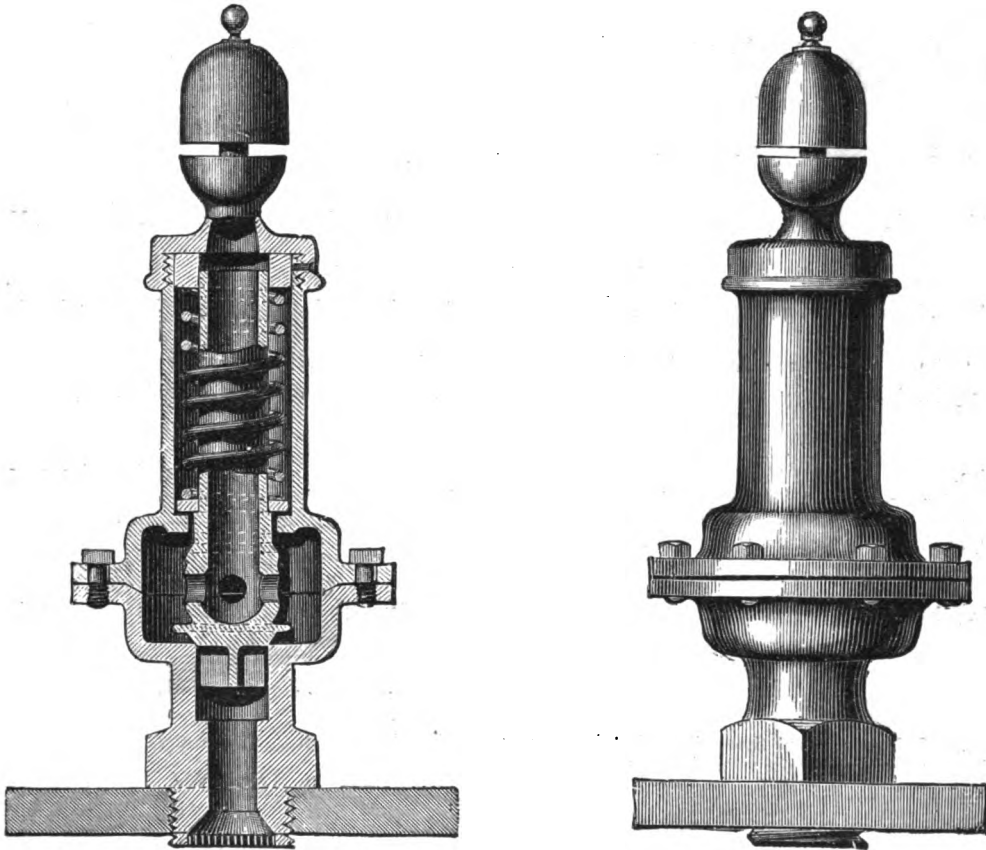
Any number of References and Testimonials can be given on application at the Offices, 11, Queen Victoria Street, London, E.C.

W. L. THOMPSON AND CO.,
 OFFICES: 11, QUEEN VICTORIA STREET, LONDON, E.C.

The attention of Engineers, Boiler Makers, and users of Steam Power is respectfully called to

SMITH'S PATENT STEAM SENTINEL,

Which combines in one instrument a PERFECT SAFETY VALVE, PRESSURE INDICATOR, and ALARM.
Being wholly enclosed, it CANNOT BE TAMPERED WITH.



A special advantage attaching to this novel and simple invention is that it CAN BE FIXED ON ANY BOILER IN TWO HOURS without breaking the manhole joint or interfering with the ordinary course of work.

It is a check against ordinary pressure gauges and safety valves of all kinds; it is a SENTINEL, guarding against irregularities, overloading, or carelessness, and warning against over-pressure from any cause. It may be relied upon when floats, gauges, or ordinary safety valves get out of order by natural corrosion or other causes not discovered until an EXPLOSION, RESULTING IN A WHOLESALE DESTRUCTION OF LIFE AND PROPERTY, has called attention to the faulty condition of these appliances TOO LATE.

These STEAM SENTINELS are regulated to any required pressure and tested before delivery,
AND SOUND AN ALARM WHEN THE PROPER PRESSURE IS EXCEEDED.

The STEAM SENTINEL is made in different sizes, to suit boilers from 1 horse-power to 1000 horse-power.

The "SENTINELS" are all made of the best Gun Metal at the following prices:

From 1 to 10 horse-power..	£1 10 0	From 30 to 50 horse-power..	£3 3 0
„ 10 to 30 „	2 2 0	„ 50 and upwards ..	5 5 0

Lock-up Safety Valves on the Sentinel principle, without the Alarm Whistle, to suit Boilers from 4 to 1000 horse-power, to blow-off at any given pressure.

W. L. THOMPSON AND CO.,

OFFICES: 11, QUEEN VICTORIA STREET, LONDON, E.C.

TESTIMONIALS AND EXTRACTS.

DEAR SIR,

27, LEADENHALL STREET, LONDON,
20th July, 1874.

Having examined your "Steam Sentinel," which is fixed to the Cornish Boiler at the Works of Messrs. Little and Sons, Haggerston, N.E., and made experiments to ascertain its capabilities, I am of opinion that it is a very valuable instrument for checking the safety valves, and ought to be fitted to every steam boiler. It will absolutely prevent overloading the safety valve, and will give warning when the maximum working pressure is attained—and as the "Sentinel" is completely locked up it cannot be tampered with. It is also a valuable check on the pressure gauge, thus adding in several ways to the security of the Boilers to which it is fitted.

I am, dear Sir, yours truly,

Mr. John Smith.

LEWIS OLRICK,
Consulting Engineer, &c., Memb. Inst. M.E.

From Messrs. BULLIVANT AND ALLEN, Wire Rope and Telegraph Cable Manufacturers, Millwall, Poplar, London, E.

DEAR SIR,

27th September, 1873.

"The Steam Sentinel," has now been in use for six months, during which time it has given us every satisfaction.

To Mr. John Smith.

Pro BULLIVANT AND ALLAN, (J. SELBY).

DEAR SIR,

12th October, 1873.

After seven months' use of your "Patent Steam Sentinel Safety Valve," we have much pleasure in stating we have every confidence in its prompt and accurate action, and have proved the value of the Sentinel on one particular occasion, and intend fixing them to our new Boilers at the Victoria Park Mills.

Yours respectfully,

To Mr. John Smith.

J. LITTLE AND SONS,
Sawing and Moulding Mills, Haggerston, N.E.

SIR,

44 AND 45, GRANGE WALK, BERMONDSEY,
27th March, 1875.

We find your Patent Steam "Sentinel" answers very well indeed in our Cornish Boiler, and shall be glad if you will send us another for our vertical Boiler at your earliest convenience.

We are, yours respectfully,

THOMAS WILSON & CO.

From THE PERSEVERANCE CO-OPERATIVE BOILER MAKING AND IRON SHIP BUILDING COMPANY (Limited), New King Street, Deptford, S.E.

DEAR SIR,

26th September, 1873.

In answer to your favour, we beg to say we have great confidence in your "Patent Steam Sentinel," and shall recommend them to the notice of all our clients. We intend fixing one to our Boiler on the Works, as we are confident of its use as a check on the pressure gauge and safety valve.

Yours faithfully,

To Mr. John Smith.

P. B. & CO., (J. JACOBS).

SIR,

STEAM BOILER WORKS, CITY BRIDGE, STRATFORD, E.,
16th July, 1874.

I consider your "Steam Sentinel" to be a first-class instrument for preventing over-pressure in Boilers. I shall recommend them whenever an opportunity offers.

I am, yours respectfully,

Mr. John Smith.

FREDERICK WARE.

W. L. THOMPSON AND CO.,
OFFICES: 11, QUEEN VICTORIA STREET, LONDON, E.C.

DEAR SIR,

OAK BREWERY, HASSARD STREET, HACKNEY ROAD, N.E.,
5th October, 1873.

We have now used your "Steam Sentinel" over nine months, and have proved its merits at various times, giving warning when the safety valve failed to act, thus preventing undue pressure that might have ended in an accident or explosion. We may further state that the Sentinel has not varied from its original pressure of 40 pounds during the entire period of its use.

To Mr. John Smith.

BELCHER & STAGG.

DEAR SIR,

COMMERCIAL BREWERY COMPANY, COMMERCIAL ROAD, E.,
6th April, 1875.

Your Patent "Steam Sentinel" fixed to our Boiler some months back gives the most perfect satisfaction. We consider every steam Boiler ought to have one fixed to same, to prevent the working pressure being exceeded, and danger to life, boiler, and property.

We shall have great pleasure in recommending the "Sentinel" to the notice of all our friends using steam power.

Yours truly,

To J. Smith, Esq.

BONNER & CO.

DEAR SIR,

BUTTON WORKS, BROMLEY-BY-BOW, LONDON, E.,
9th October, 1873.

We have now had your Patent "Sentinel" Safety Valve on our 25 H.-P. Cornish Boiler some months, and consider it a complete safeguard, and will prevent an accident or explosion from undue pressure to any Boiler using same, and further state we are perfectly satisfied with its action.

To Mr. John Smith, Consulting Engineer.

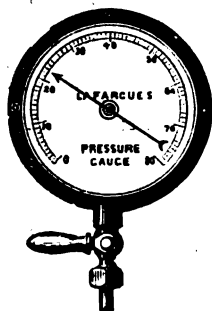
E. MINCHER & CO.

The following are a few of the Firms that have adopted the PATENT STEAM SENTINEL:

THE TYNE ALKALI COMPANY, LIMITED, South Shields.
THE SUNDERLAND AND SOUTH SHIELDS WATER COMPANY, Sunderland.
THE GLAMORGANSHIRE COLLIERY COMPANY, LIMITED, South Wales.
Messrs. BALDWIN, Engineers, Burnham, Bucks.
THE PERSEVERANCE BOILER MAKERS' COMPANY, LIMITED, King Street, Deptford, London, S.E.
Messrs. PARSONS, Saw Mills, Shaftesbury Park Estate, Wandsworth, London, S.W.
" BULLIVANT AND ALLEN, Wire Rope Works, Millwall, London, E.
" LITTLE AND SONS, Saw Mills, Haggerston Wharf, London, N.E.; and Victoria Mills, Victoria Park, E.
" BELCHER AND STAGG, Oak Brewery, Hassard Street, Hackney Road, London, E.
" SAGE AND CO., Engineers, the Island of Java.
" VICKERS AND BURR, 133, Upper Thames Street, London, E.C.
" WILSON AND CO., Grange Walk, Bermondsey, London, S.E.
" STRAKER BROS., Camomile Street, London, E.C.
" SPRATT, Biscuit Manufactory, Bermondsey, London, S.E.
" BRINGMEAD, Piano-Forte Manufactory, Ryland Road, Kentish Town, London, W.
" BREEDS AND CO., Hastings Brewery, Hastings.
" COULTHARD AND CO., Engineers, Richmond Street Iron-Works, Sunderland.
" HAMMERS, Blue Anchor Lane, Bermondsey, London, S.E.
" OASTLER AND PALMER, Tanners, Bermondsey, London, S.E.
" BARROW BROS., Tanners, Bermondsey, London, S.E.
" YOUNG AND CO., Tanners, Bermondsey, London, S.E.
" J. AVERY AND CO., Saw Mills, 3, Spencer Place, Victoria, London.
THE CROYDON GAS COMPANY, Croydon.
Mr. A. MARSHALL, Boiler Maker, Whitechapel, London, E.
&c. &c. &c.

W. L. THOMPSON AND CO.,

OFFICES: 11, QUEEN VICTORIA STREET, LONDON, E.C.

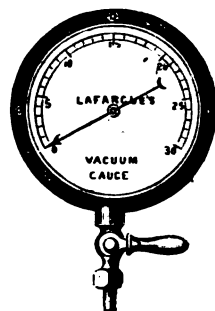


W. L. THOMPSON AND CO.,

MANUFACTURERS AND AGENTS,

Offices : 11, QUEEN VICTORIA STREET,

LONDON, E.C.,



**SUPPLY PRESSURE, VACUUM, AND HYDRAULIC GAUGES,
AND BRASS FITTINGS GENERALLY,**

**AS SUPPLIED TO H.M. GOVERNMENT, THE PRINCIPAL RAILWAY COMPANIES
AND ENGINEERS DURING THE LAST FIVE YEARS.**

W. L. T. AND Co. beg to call the attention of Engineers and others to their Bourdon Gauges, fitted with Patent solid Enamel Dials, adapted for Steamships, Locomotives, and all other purposes where they are exposed to great heat, thereby preventing the obliteration of the figures, which frequently occurs in ordinary Gauges.

They are fitted with Nickel-Silver Centres and Tubes to prevent rust, or the Gauge from stopping if the glass should break or the steam get in.

PRICE LIST OF GAUGES.

With solid Gun-Metal Cases, Nickel-Silver Tubes and Arbours, highly finished, and tested by a mercurial column up to 30, 60, 80, 100, 150, and 200 lb. per square inch.

					£	s.	d.
7-inch diameter Gauges, with Gun-Metal Cock, complete	..	2	5	0			
6 " " " "	..	2	0	0			
5 " " " "	..	1	15	0			
4 " " " "	..	1	10	0			

A CONSIDERABLE REDUCTION MADE FOR LARGE QUANTITIES.

W. L. THOMPSON AND CO.,

OFFICES : 11, QUEEN VICTORIA STREET, LONDON, E.C.

W. L. THOMPSON AND CO.,
METAL MERCHANTS AND MACHINERY AGENTS,
CONTRACTORS FOR ALL KINDS OF IRON, STEEL, AND BRASS WORK,
TOOLS AND IMPLEMENTS GENERALLY,
11, QUEEN VICTORIA STREET, LONDON, E.C.

W. L. T. AND CO., having direct Agencies with the best Houses, are in a position to give low quotations for the undermentioned, viz.:

ENGINES:

Vertical.
 Horizontal.
 Portable, &c., &c.

BOILERS:

Cornish.
 Vertical.
 Lancashire, &c.

MISCELLANEOUS**MACHINERY, &c., &c.**

Grinding Mills for all purposes.
 Sawing Machinery.
 Reapers and Mowers.
 Hay Makers.
 Thrashing Machines.
 Ploughs.
 Cultivators.
 Horse Gears of all kinds.
 Dressing Machines.
 Horse Rakes.
 Harrows.
 Bean Mills.
 Corn Drills.
 Rolls, Land.
 " Garden.
 Lawn Mowers.
 Weighing Machines.
 Chaff Cutters.
 Root Pulpers.
 Turnip Cutters.
 Oil Cake Breakers.
 Agricultural Carts } With
 Brewers' " } Patent
 Contractors' " } Tipping
 Builders', &c. " } Apparatus.

Water Carts.

Manure Carts.

Wagons.

Asphalting Apparatus complete.

Avellers.

Corn Screens.

" Rick Stands.

Horse-power Pumps.

Mortar Mills.

Malt Kiln Stoves.

Knife Holders.

Hay Gatherers.

Grindstones, Portable.

Extirpators, Weed and Poppy.

Stacking Machines.

IRON:

Tools of all kinds.

Iron Roofs of all kinds.

Tanks

and

Cisterns

} Cast and Wrought.

Rifle Targets.

Plates.

Bars.

Angles.

Tees.

Rails.

Hoops.

Nails.

Screws.

Bolts.

Nuts.

Galvanized Corrugated Sheets.

Black

Gas Tubes.

Steam

Water

Boiler Tubes.

Tube Fittings.

Iron Wire.

Galvanized Wire Rope.

Telegraph Wire.

Fencing

Bar Fencing.

Gates.

Railings.

Lamp-posts, and all kinds of

Castings.

Stable Fittings.

&c. &c.

BRASS:

Brass and Water Gauge Fittings.

Pressure Gauges.

Vacuum

Cocks.

&c. &c. &c.

STEEL:

Plates.

Bars.

Hoops.

Files.

&c. &c.

LEAD.**ZINC.****COPPER.****YELLOW METAL.****SPELTER.**

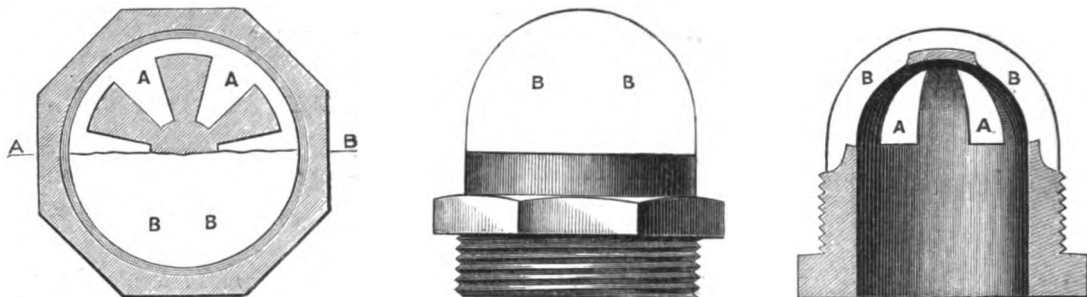
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W. L. THOMPSON AND CO.,

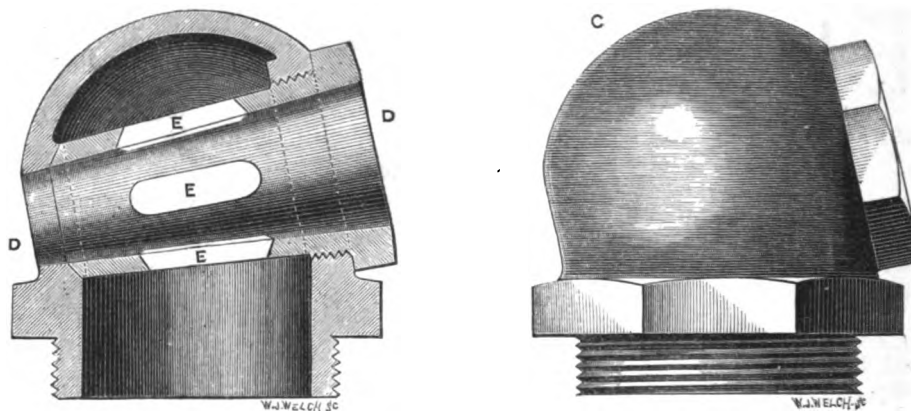
OFFICES: 11, QUEEN VICTORIA STREET, LONDON, E.C.

EXTENSIVELY ADOPTED BY ENGINEERS, BOILER MAKERS, AND USERS OF STEAM POWER THROUGHOUT THE UNITED KINGDOM AND ABROAD.

SMITH'S PATENT EXCELSIOR FUSIBLE PLUG,



FOR PREVENTING EXPLOSIONS AND COLLAPSE OF FLUES FROM SHORTNESS OF WATER, Suitable for Land, Locomotive, Marine, and every class of Boiler.



The leading features of these Plugs are Novelty, Simplicity, and Efficiency. Incrustation, which the fatal objection to Fusible Plugs, is defied.

Nos. 1 and 2 Plugs are coated over with Fusible Metal, and the spaces filled in with same, see **A A** and **B B**; when the water gets below **A A** the metal directly fuses, and should any Incrustation be formed on the crown of the Plug, the same gives way from the metal yielding under it, and the steam and water rush through the spaces **A A**, and immediately put out the fire, thereby preventing Collapse of Flues or Explosion.

Nos. 3 and 4 Plugs. **C C** forms the Plug Chamber, **D D** the Circulating Tube, **E E E** the Fusible Metal run into the three spaces, which fuses immediately the water gets below the spaces named; the steam and water then rush through the spaces, and put out the fire as in the case of Nos. 1 and 2 Plugs.

A circulation of water takes place through the said tube, thereby preventing Incrustation doing any injury to the metal in same.

Instructions sent with all Plugs as to Fixing.

The Plugs are screwed to suit the following gas threads, viz. 1 inch, 1½ inch, 1¾ inch, and 2 inch.

Keys are forwarded, if required, to suit circulating tube, at 2s. 9d. each.

W. L. THOMPSON AND CO.,

OFFICES : 11, QUEEN VICTORIA STREET, LONDON, E.C.

ARCHIBALD SMITH AND CO.'S

LATEST IMPROVED

PATENT DOUBLE-ACTION DOOR SPRINGS.

TRADE

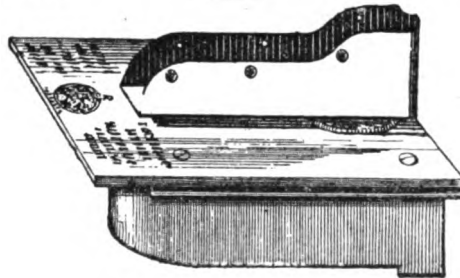


MARK.

They are fitted with all most recent improvements, Arrangement for adjusting of their warping or otherwise Patent Regulating Top Centre

ARCHIBALD SMITH AND Co.'s including Patent Regulating the Door in the event not setting true, and for tightening up the Door.

UPWARDS OF 40,000
NOW IN USE
IN ALL PARTS OF
THE WORLD.



THE ONLY SPRING
THAT
HAS YET STOOD
A GUARANTEE.

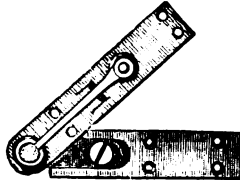
ADJUSTABLE TOP CENTRE,

REGISTERED.

REGISTERED
SPRING STOP OR CATCH,



For Swing Doors.

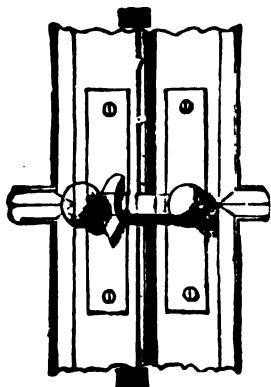


Supplied with each Door Spring.

BUFFER SPRING,



For Swing Doors.

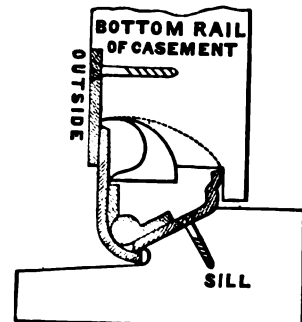


ARCHIBALD SMITH AND CO.'S
PATENT WEATHER-TIGHT
CASEMENT FASTENING,

AND

PATENT WEATHER-TIGHT
SILL BAR,

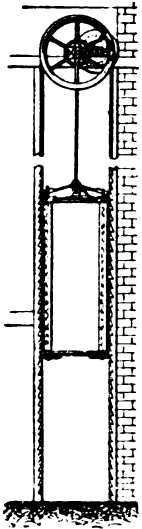
The only acknowledged Fastening and Water Bar for effectually excluding weather in FRENCH CASEMENTS.



ARCHIBALD SMITH AND CO.,

ENGINEERS AND FOUNDERS,

69, PRINCES STREET, LEICESTER SQUARE, LONDON; AND THE COLNE VALLEY
IRON-WORKS, HALSTEAD, ESSEX.



ARCHIBALD SMITH AND CO.'S

IMPROVED

WAREHOUSE AND HOSPITAL LIFTS.

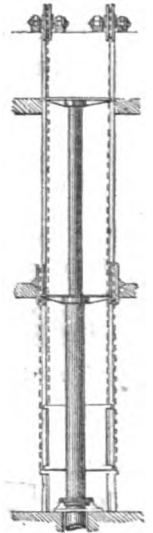
These Lifts are constructed for heavy loads, and, as in case of hospitals, where great safety and smoothness of working is required. They are constructed with great power in proportion to their loads, and are easily worked by means of the hand rope.

The Brake Apparatus is particularly strong and reliable, and every part is carefully counterbalanced. Particular attention is drawn to the Safety Apparatus, so that should the Suspension Rope break, or become deranged or damaged, the cage will be stopped immediately in its descent, and prevent accident or loss of life.

ARCHIBALD SMITH AND CO.'S

IMPROVED HYDRAULIC LIFT.

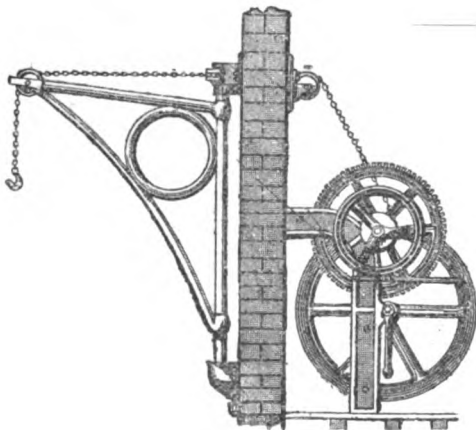
These Lifts are worked by the pressure of water from a cistern or any other head of water, and are strongly recommended for all places where a head of water exists, on account of their perfect safety, ease of control, and steadiness of working, there being no manual power, the only thing to do being to turn on a tap and let the water into the ram.



ARCHIBALD SMITH AND CO.'S

IMPROVED

WAREHOUSE CRANES.



These Cranes are constructed to lift from 1 to 10 tons, and with a radius of Jib of from 3 to 9 feet; indeed, any reasonable radius of Jib may be made.

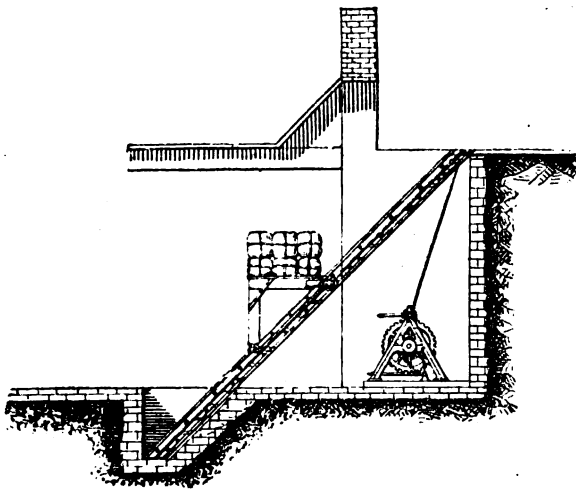
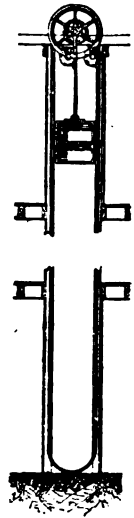
ARCHIBALD SMITH AND CO.,

ENGINEERS AND FOUNDERS,

69, PRINCES STREET, LEICESTER SQUARE, LONDON; AND THE COLNE VALLEY
IRON-WORKS, HALSTEAD, ESSEX.

ARCHIBALD SMITH AND CO.'S SMALL DINNER AND HOUSE LIFT.

These Lifts are made for raising light loads to any height—we prefer not to use them for loads above 56 lb.—and are specially adapted for eating-houses and domestic purposes, thereby saving an immense amount of labour and dirt in going up and down stairs with everything, such as coals, &c. We are now fixing a large number in and around London. Further particulars on application.



ARCHIBALD SMITH & CO.'S
IMPROVED

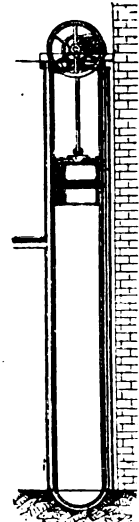
CELLAR HOIST.

These Lifts are being largely adopted in the City in all places where a load is required to be lifted from below up to and out on the pavement of the streets, and they can be strongly recommended for the ease with which they work and the small amount of room taken up, and are particularly adapted for all warehouses.

ARCHIBALD SMITH AND CO.'S

LARGE DINNER OR HOUSE LIFT.

These lifts are constructed to carry loads up to 2 cwt., and are fitted with all the most improved and modern appliances—Brake Apparatus, and, where required, Indicator Bells, so that a person working the Lift on one floor will know when it has arrived opposite any other floor that may be required to be reached. They are sometimes made with double cages.

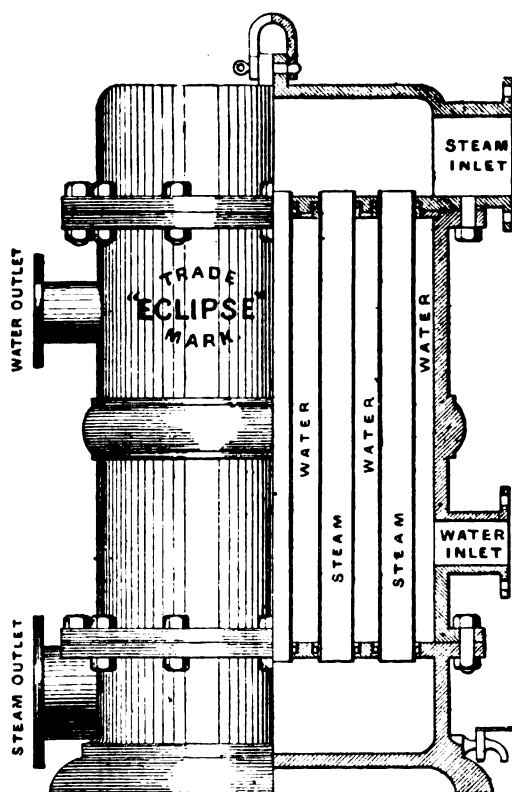


ARCHIBALD SMITH AND CO.,
ENGINEERS AND FOUNDERS,

69, PRINCES STREET, LEICESTER SQUARE, LONDON; AND THE COLNE VALLEY
IRON-WORKS, HALSTEAD, ESSEX.

ARCHIBALD SMITH AND CO.'S MULTITUBULAR "ECLIPSE" WATER HEATER.

GREAT SAVING OF FUEL.



The Feed Water for the Boiler is passed through these Heaters (which stand between the Engine and Boiler), and is heated by the waste steam from the Engine to within 6 or 8 degrees of boiling point, before entering the Boiler. The temperature of the water has therefore to be raised only a few degrees to reach the point at which steam is produced.

Thereby a great saving in fuel is effected, shown by actual test to be as much as one-third.

The first cost of these Heaters is therefore saved in a very short time.

Lime and other injurious matters are precipitated in the Heater before the water enters the Boiler.

The efficiency and life of the Boiler are thereby greatly increased.

"It has long been acknowledged that the best Water Heater is that which does not allow exhaust steam from the Engine to come into direct contact with the Feed Water, but that the steam should pass through pipes over or around which the Feed Water is made to pass."—*Vide Engineer*, May 21, 1875.

No.	SIZE OF HEATERS.		Horse-power.	Price at Works.
	Diameter.	Height.		
	ft. in.	ft. in.		
1	1 0	5 6	For 6 Horse-power.	£ 12
2	1 3	5 6	" 10 "	15
3	1 5	5 6	" 14 "	18
4	1 7	5 6	" 18 "	21
5	1 10	5 6	" 24 "	26
6	2 0	5 6	" 30 "	32

Duplicate Tubes which fit any size Heater, 5s. each.

Ring Joints for Tubes, 5s. per dozen.

ARCHIBALD SMITH AND CO.,
69, PRINCES STREET, LEICESTER SQUARE, LONDON; AND THE COLNE VALLEY
IRON-WORKS, HALSTEAD, ESSEX.

ARCHIBALD SMITH AND CO.'S MULTITUBULAR "ECLIPSE" WATER HEATER.

GREAT SAVING OF FUEL.

Adapted for any kind of Engine or Boiler.

No extra Pump required.

When no provision is made for supplying HOT instead of COLD water to a steam Boiler all substances which are held in suspension in the water, such as LIME, CHALK, &c., pass into the Boiler, and being deposited on the iron plates, form an INCRUSTATION, and not only prevent the rapid production of steam, whereby the economy of the Boiler is greatly reduced, but is frequently the cause of disastrous explosions.

The effect of the Feed-Water Heater, in addition to its great heating properties, is to INTERCEPT and PRECIPITATE all such injurious substances before they reach the Boiler. It is therefore of paramount importance that the internal arrangement of a Feed-Water Heater should be of the simplest kind, without at the same time interfering with efficiency.

The "ECLIPSE" Water Heater possesses all these properties.

The Tubes through which the waste steam from the Engine passes, are so arranged that by bolting down the cover of the Heater every joint is at the same time perfectly made, and by the removal of the cover every tube can be taken out for examination or cleaning, and any labourer can take the whole apart, clean, and replace the tubes in perfect order, without the possibility of a mistake, in an incredibly short space of time.

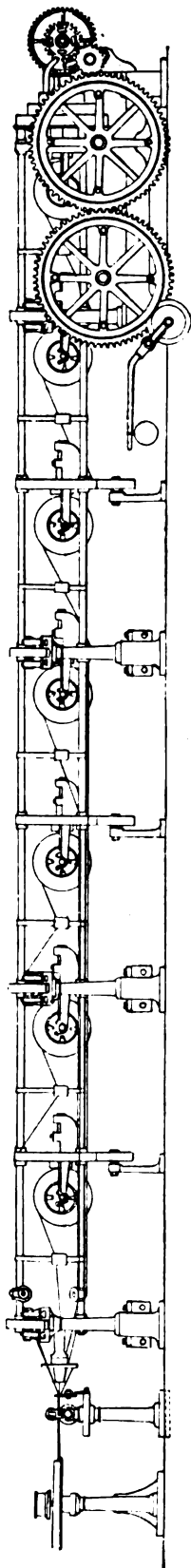
The Heater is placed anywhere between the Engine and Boiler, and immediately the waste steam is turned through it, a great and permanent REDUCTION in the consumption of FUEL is the result.

The Tubes in every "ECLIPSE" Heater are interchangeable, those of one size Heater can be used for another without alteration or fitting, therefore for EXPORTATION and all other purposes the "ECLIPSE" Feed-Water Heater is invaluable.

ARCHIBALD SMITH AND CO.,

69, PRINCES STREET, LEICESTER SQUARE, LONDON; AND THE COLNE VALLEY
IRON-WORKS, HALSTEAD, ESSEX.

IMPROVED PATENT WIRE ROPE AND STRAND MACHINE.



ARCHD. SMITH AND CO., PATENTEES AND SOLE MANUFACTURERS.

WIRE ROPE AND CABLE MACHINES.

BY ROYAL



LETTERS PATENT.

ARCHD. SMITH AND CO.'S IMPROVED PATENT
WIRE ROPE AND STRAND MACHINES.

	Number of Bobbins in Machine.	Approximate Weight of Wire on each Bobbin.	Range of Wire the Machine is adapted for.	Size Rope Machine will make.	Speed of Machine per Minute.	Length of Machine.	Width.	Height.	Horse-power required.	Price.	Extra if on Iron Girder Foundations.
No.		lb.	B. W. G.	Circum- ference.	Revs.	ft.	ft.	ft.		£	£
1	7	28	30 to 20	...	450	17	2	2	$\frac{1}{2}$	95	..
2	7	40	24 ,, 18	..	400	19	2	2	$\frac{1}{2}$	115	..
3	7	$1\frac{1}{2}$ cwt.	20 ,, 12	1 to 2 $\frac{1}{2}$ in.	350	26	3	3	2	150	30
4	7	2	18 ,, 8	1 ,, 2 $\frac{1}{2}$ in.	300	33	3 $\frac{1}{2}$	3 $\frac{1}{2}$	2 $\frac{1}{2}$	200	40
5	7	3 $\frac{1}{2}$	14 ,, 6	1 ,, 3 $\frac{1}{2}$ in.	200	40	4	4	3	300	45
6	7	11	8 ,, 0	2 ,, 4 $\frac{1}{2}$ in.	150	50	5	5	4	450	70

For Machines to carry 9 Bobbins add 25 per cent. to above prices.

" " 12 " 50 " "

These Patent Machines produce three times the quantity of work made by any other Machine or means, in the same time, of a superior quality, and for one-half the cost for power; less wear and tear of Machinery; less danger to those employed; less injury to, and without any twist in the individual wires.

Since their introduction they have been adopted by all the principal Wire-Rope Makers in England and Abroad.

Price includes:—Packing and delivery into Railway Truck at Works; spare set of Bobbins to each Machine; set of Change Wheels; Measuring Indicator, and self-acting Coiling-up Reel.

ARCHIBALD SMITH AND CO.,
69, PRINCES STREET, LEICESTER SQUARE, LONDON;
AND
THE COLNE VALLEY IRON-WORKS, HALSTEAD, ESSEX.

SAMELS' PATENT LOCKS

Combine increased security with simplicity and cheapness of construction. The Latch Bolts are *reversible* in the easiest possible manner to suit either right or left hand.

The working parts being confined in a small case, no mortising into the rail is required, but the rod for working the latch can be extended to any length for the handles to be placed as far as desired from the key-hole or edge of the door.

Locks in suites, with Master Keys to pass, made to any size or design for Mansions, Hotels, Public Buildings, Hospitals, Asylums, Ships, Conservatories, Prisons, &c.

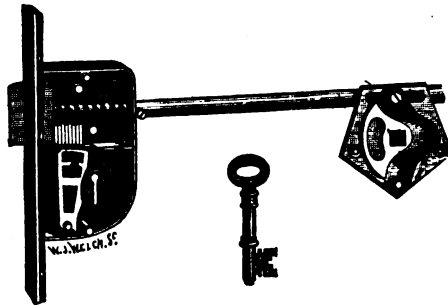
Small and neat Keys.

Every Lock Reversible.

Very strongly made.

First-Class Workmanship.

Lowest Remunerative Prices.



Orders to be accompanied by a Remittance, unless account specially arranged for. Cheques to be crossed National Provincial Bank of England. Post-Office Orders payable New Cross.

MANUFACTORY:

SAMELS' PATENT LOCK WORKS AND BRASS FOUNDRY,

2, NEW CROSS ROAD, LONDON, S.E.

Close to Old Kent Road Station. Nine minutes from London Bridge. Twenty-five minutes from Victoria. Half-hour by road from any of the London Bridges. Tramway Cars pass the door every few minutes to and from Westminster, Blackfriars Obelisk, Elephant and Castle, Borough, Clapham, and Greenwich.

Wholesale and for Exportation.

SAMPLE LOCKS SENT TO ANY PART ON RECEIPT OF P.O. ORDER.

IN ORDERING SAMELS' PATENT LOCKS, PLEASE STATE

Name		Address			Date	
When wanted.	Quantity required.	Description.			At	Amount.
		Letter.		Lever.		
						£ s. d.

A. E. SAMELS AND CO.,

ENGINEERS AND BRASS FOUNDERS, 2, NEW CROSS ROAD, LONDON, S.E.

SAMELS' PATENT LOCKS.

Cash Price List—REVISED—June, 1875.

UPRIGHT MORTISE LOCKS Same price as Mortise Night Latches. Half-rebated Locks, 1s. 6d. extra. Full-rebated Locks, 4s. extra.	DESCRIPTION.						Depth of Mortise.	Position of Handles.
	Letter	¹ Lever.	² Lever.	³ Lever.	⁴ Lever.	⁵ Lever.	⁶ Lever.	
ONE-BOLT MORTISE LOCKS	A	4/0	5/0	6/0	7/0	8/0	9/0	2
Ditto, Best Town-made	B	5/0	6/0	7/0	8/0	9/0	10/0	2½
" " brass bolts	C	6/0	7/0	8/0	9/0	10/0	11/0	2½
" ALL BRASS	D	7/0	8/0	9/0	10/0	11/0	12/0	2½
" " gun-metal bolts	E	10/0	11/0	12/0	13/0	14/0	15/0	3
" " " BEST	F	12/0	15/0	18/0	21/0	24/0	27/0	3½
TWO-BOLT MORTISE LOCKS	G	5/0	5/9	6/6	7/6	9/0	10/0	2½
Ditto, Best Town-made	H	6/0	7/0	8/0	9/0	10/0	11/0	2½
" " brass bolts	I	7/0	8/0	9/0	10/0	11/0	12/0	2½
" ALL BRASS	K	8/0	9/0	10/0	11/0	12/0	13/0	2½
" " gun-metal bolts	L	11/0	12/0	13/0	14/0	15/0	16/0	3
" " " BEST	M	15/0	18/0	21/0	24/0	27/0	30/0	3½
MORTISE SPRING LOCKS	N	8/0	10/0	12/0	14/0	16/0	18/0	3
Ditto, Best Town-made	O	10/0	12/0	14/0	16/0	18/0	20/0	3
" " brass bolts	P	12/6	15/6	17/6	20/0	22/6	25/0	3
" ALL BRASS	Q	15/0	17/6	21/0	24/0	27/0	30/0	3
" " gun-metal bolts	R	17/6	21/0	24/0	27/0	30/0	33/0	3½
" " " BEST	S	21/0	24/0	27/0	30/0	33/0	36/0	4
MORTISE NIGHT LATCHES	T	7/0	8/0	9/0	10/0	11/0	12/0	small 2½ 4
Ditto, Best Town-made	V	9/0	10/0	11/0	12/0	13/0	14/0	
" " brass bolts	W	11/0	12/0	13/0	14/0	15/0	16/0	
" ALL BRASS	X	12/0	13/0	14/0	15/0	16/0	18/0	
" " gun-metal bolts	Y	15/0	16/6	17/0	18/0	19/0	20/0	
" " " BEST	Z	21/0	24/0	27/0	30/0	33/0	36/0	
MORTISE DEAD LOCKS								
" ALL BRASS	A A	3/0	4/0	5/0	6/0	7/0	8/0	
" " "	A B	6/0	7/0	8/0	9/0	10/0	11/0	
" " "	A C	9/0	10/0	11/0	12/0	13/0	14/0	
BRASS MORTISE LATCHES		No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	any special distance from the edge.
" To latch only	A D	3/0	4/0	5/0	6/0	7/0	8/0	
" To latch and bolt	A E	4/0	5/0	6/0	7/0	8/0	10/0	
BRASS MORTISE BOLTS	A F	2/0	2/6	3/0	3/6	4/0	5/0	

A. E. SAMELS AND CO.,

ENGINEERS AND BRASS FOUNDERS, 2, NEW CROSS ROAD, LONDON, S.E.

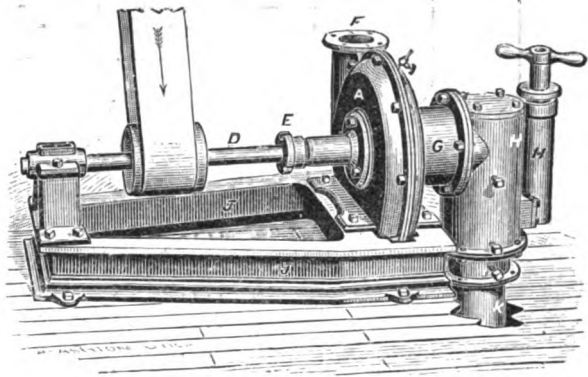
AMERICAN CATARACT CENTRIFUGAL PUMPS.

WEST AND DU VALLON are the Sole Agents for the American Cataract Centrifugal Pump.

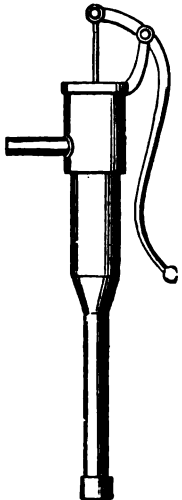
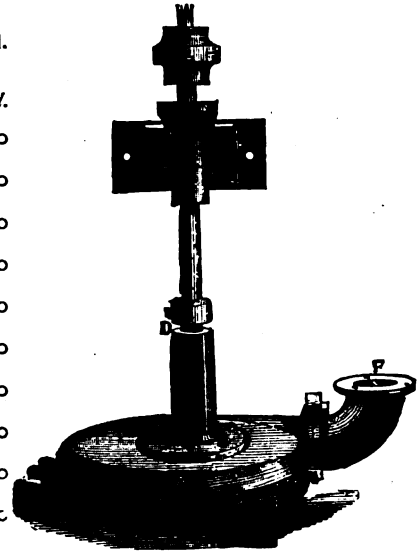
The capabilities of this Pump for discharging large quantities of water are truly wonderful.

There are two kinds: the Vertical Pump is placed in the liquid to be raised.

The Horizontal Pump is placed above the liquid; when the depth of the liquid below the Pump is considerable, it is fitted with small Hand Pump, to fill the Suction Pipe before starting.



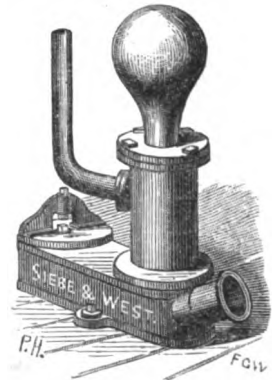
Size of Dis- charge Pipe. Inches.	Capacity per Min. Gallons.		Vertical. Price.			Horizontal. Price.		
			£	s.	d.	£	s.	d.
1½	100	....	7	0	0	8	5	0
2	250	....	12	10	0	14	10	0
2½	350	....	14	10	0	16	10	0
3	500	....	15	10	0	19	0	0
4	700	....	23	0	0	26	0	0
5	1000	....	30	0	0	35	0	0
6	2500	....	36	0	0	40	10	0
7	3000	....	45	0	0	50	0	0
8	4000	....	55	0	0	65	0	0
10	6500	....	70	0	0	75	0	0



Portable Pump in Copper or Galvanized Iron, 7 feet under spout, wrought-iron handle, brass bucket and valve.

Diameter of Pump.		Copper.			Galvanized Iron.		
		£	s.	d.	£	s.	d.
2 in.	....	5	10	0	2	5	0
3 "	....	6	0	0	3	0	0
4 "	....	8	0	0	4	5	0

These Pumps can be fitted with flanged ends, or sliding suction pipes from 6 feet to 12 feet long enable the suction pipe to be lengthened as the fall of the liquor may require.



HYDRAULIC RAMS,

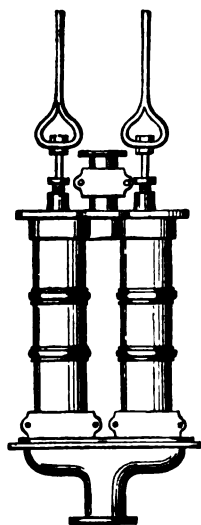
Self acting, for supplying water to Mansions, &c., from a stream or river.

STEAM PUMPS, DOUBLE-ACTING PUMPS FOR HOT OR COLD LIQUOR, &c.

WEST AND DU VALLON

(LATE SIEBE, WEST, AND CO.),

HYDRAULIC AND PNEUMATIC ENGINEERS, MILLWRIGHTS, COPPERSMITHS, &c.,
MASON STREET, WESTMINSTER BRIDGE ROAD, LONDON, S.E.
WORKS: BIRMINGHAM.



PUMPS, AIR PUMPS, &c.

BRASS BARREL DEEP-WELL PUMPS,

WITH DOORWAYS TO GET AT VALVES.

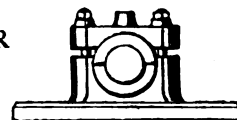
Diameter of Pump.	Single Barrel.			Double Barrel.			Treble Barrel.		
	£	s.	d.	£	s.	d.	£	s.	d.
2	6	15	0	12	10	0	18	0	0
2½	10	10	0	15	0	0	22	0	0
3	12	0	0	18	0	0	25	0	0
3½	15	0	0	21	0	0	30	0	0
4	18	0	0	25	0	0	38	0	0
5	22	0	0	30	0	0	50	0	0
6	26	0	0	35	0	0	85	0	0

AIR PUMPS WITH OR WITHOUT STEAM ENGINES ATTACHED.

AIR PUMPS CONSTRUCTED TO FINISH AT PISTON ROD
FOR CONNECTING TO OTHER MACHINERY.

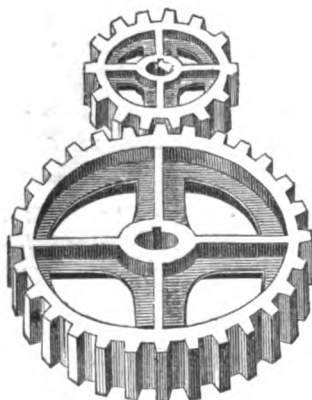
WEST AND DU VALLON, having a large assortment of Wheel patterns, are prepared to supply Cast-Iron Pulleys, Spur, Bevel, or other Wheels, either in the rough, turned, bored, and key-seated, at a very short notice.

WROUGHT-IRON SHAFTING AND COUPLINGS, POLISHED OR
BLACK, CAST-IRON PLUMMER BLOCKS, AND GUN-METAL BEARINGS.



MANUFACTURERS OF STEAM ENGINES, HORIZONTAL, VERTICAL, HIGH AND LOW PRESSURE, AND CONDENSING, ALSO WITH IMPROVED VARIABLE EXPANSION AND EQUILIBRIUM VALVES.

STEAM BOILERS ON THE VERTICAL, TUBULAR, AND CORNISH PRINCIPLES.



MANUFACTURERS OF HYDRAULIC PUMPS, HYDRAULIC LIFTS, HYDRAULIC PRESSES, PNEUMATIC RAILWAYS, VENTILATING MACHINERY FOR MINES AND BUILDINGS, BLOWING FANS, EXHAUST FANS, &c.

SINGLE OR DOUBLE ACTING AIR PUMPS FOR VACUUM OR PRESSURE, EITHER VERTICAL OR HORIZONTAL, AS APPLIED FOR COAL CUTTING AND ROCK BORING MACHINES, TUNNELLING, VENTILATING, SUGAR REFINERIES, CHEMICAL WORKS, AND OTHER PURPOSES.

W. AND D. guarantee their Air Pumps to produce 29 inches of vacuum, and to compress air up to 500 pounds on the square inch.

WEST AND DU VALLON

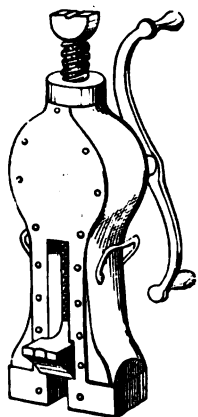
(LATE SIEBE, WEST, AND CO.),

HYDRAULIC AND PNEUMATIC ENGINEERS, MILLWRIGHTS, COPPERSMITHS, &c.,
MASON STREET, WESTMINSTER BRIDGE ROAD, LONDON, S.E.

WORKS: BIRMINGHAM.

LIFTING JACKS.

These Machines are so extremely useful, and save so much time, that no employers of labour should be without them.



HALEY'S PATENT LIFTING JACK.

IN WOOD OR IRON FRAMES.

No.	Will run out	Will lift	Price.
1	113 in.	2 tons.	£ 4 15 0
2	13 "	4 "	5 5 0
3	3 "	6 "	6 0 0
4	13 "	8 "	7 5 0
5	13 "	10 "	8 10 0

TRIPOD JACKS.

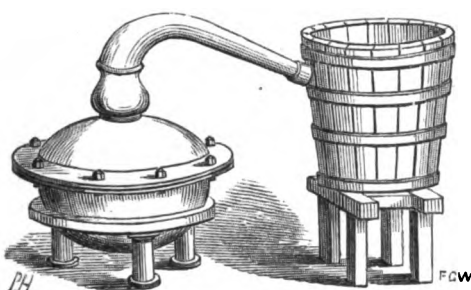
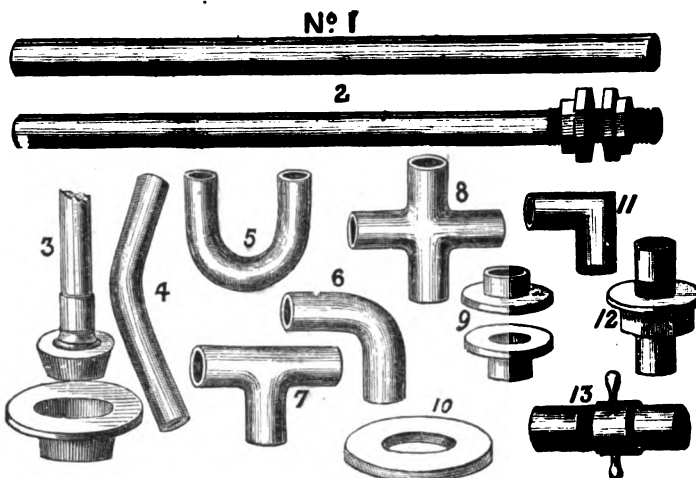
No.	Height drawn.	Will lift	Price.
1	1 ft. 0 in.	2 tons.	£ 1 15 0
2	1 " 6 "	4 "	2 10 0
3	2 " 0 "	6 "	3 15 0



WEST AND DU VALLON manufacture every description of copper work at the lowest remunerative prices.

Copper Pipes, from $\frac{3}{8}$ inch to 5 inches diameter, kept in stock.

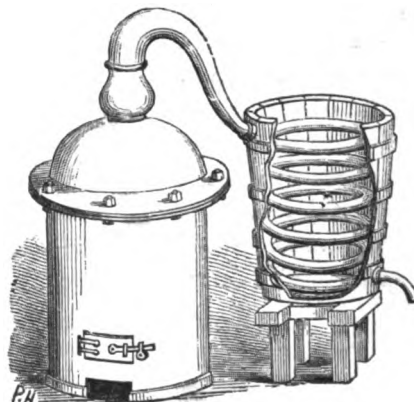
Washers, Flanges, Cross Pieces, Tees, U or Y Pieces, square and round Elbows, Basin and Sink Plugs, Screwed Ends and Connections.



COPPER STILLS.

For Chemical Works, Laboratories, Dye Houses, Distilleries, &c., &c.

Copper Syphons and Measures, for Brewers, Distillers, &c.; Copper Funnels, &c.

COPPER STEAM COILS,
COPPER ATTEMPERATORS, &c.

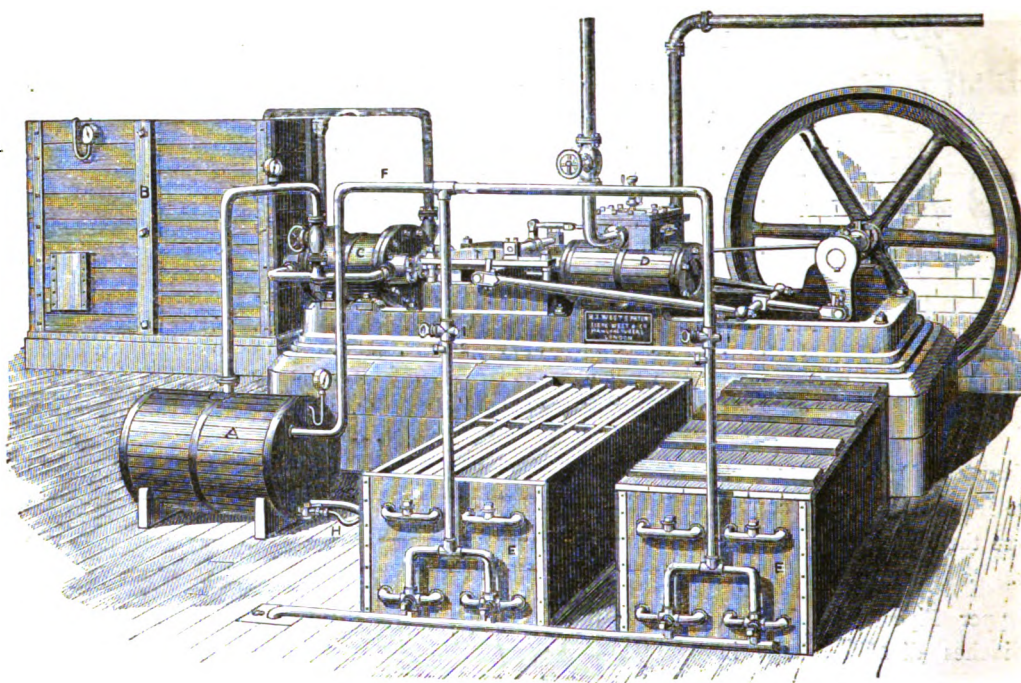
WEST AND DU VALLON

(LATE SIEBE, WEST, AND CO.),

HYDRAULIC AND PNEUMATIC ENGINEERS, MILLWRIGHTS, COPPERSMITHS, &c.,
MASON STREET, WESTMINSTER BRIDGE ROAD, LONDON, S.E.
WORKS: BIRMINGHAM.

3 G 2

ICE-MAKING MACHINERY.



WEST AND DU VALLON are sole manufacturers of this patent machinery for the manufacture of transparent block ice for commercial purposes. The ice can be made for 5s. per ton.

The Machines are constructed to produce from 25 lb. hourly to 50 tons daily.

Apparatus for the manufacture of ice in small quantities, for hotels, clubs, hospitals, passenger and troop ships, &c.

Apparatus to make fancy ices, to cool wines, soda-water, lemonade, and drinking water.

The cooling of air or liquids for the salting and preserving of meat, cooling meat-markets in summer, dairies, &c.

For the extraction of paraffine from oils, the solidification of fatty or composite matters, and for all purposes where an evolution of heat is desirable.

For refrigerating wort in breweries, &c.

Ice can be made in blocks from 3 to 12 feet long, 3 feet wide, and from 2 inches to 3 feet thick, as transparent as the finest plate glass. These blocks weigh from 20 lb. to 2 tons each.

500,000 cubic feet of air cooled hourly to the freezing point.

W. AND D. are also makers of soda-water machinery and apparatus in connection therewith.

Illustrated Catalogue, 12 Stamps.

ICE SAFES AND REFRIGERATORS, &c.

WEST AND DU VALLON

(LATE SIEBE, WEST, AND CO.),

HYDRAULIC AND PNEUMATIC ENGINEERS, MILLWRIGHTS, COPPERSMITHS, &c.,

MASON STREET, WESTMINSTER BRIDGE ROAD, LONDON, S.E.

WORKS: BIRMINGHAM.

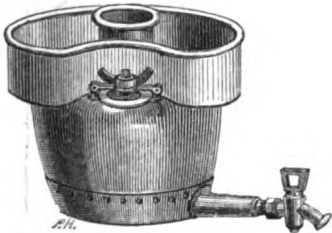
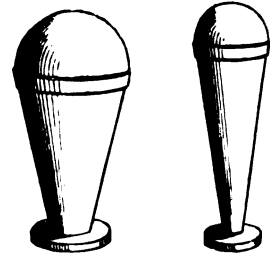
COPPER UTENSILS.



BREWERS' COPPERS.

COPPER VACUUM-PANS.

COPPER AIR-VESSLS.



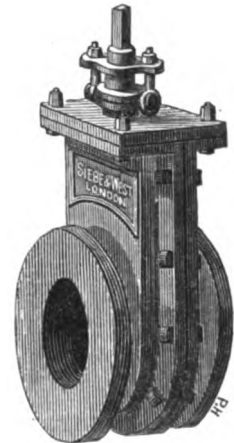
*Every description of Copper Work executed
promptly.*

Yard Bells for Contractors and others.



SLUICE VALVES, BRASS SLIDES, AND
SEATINGS.

LEAD PIPES AND SHEETING.
LEAD CISTERNS FOR INSIDE WOOD
TANKS.



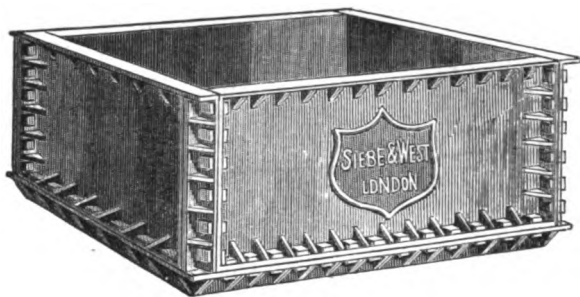
WEST AND DU VALLON are manufacturers of every description of Water
Pumps, Gearing, Irrigating, and Drainage Machinery, &c.

WEST AND DU VALLON

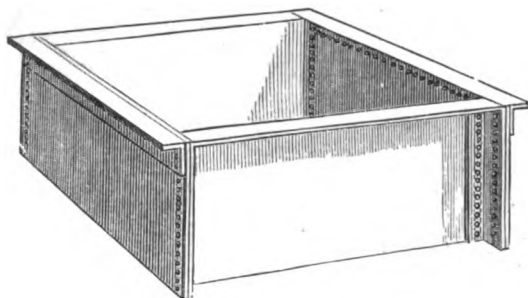
(LATE SIEBE, WEST, AND CO.),

HYDRAULIC AND PNEUMATIC ENGINEERS, MILLWRIGHTS, COPPERSMITHS, &c.,
MASON STREET, WESTMINSTER BRIDGE ROAD, LONDON, S.E.
WORKS: BIRMINGHAM.

TANKS.



These Tanks are carefully stayed inside to resist the pressure of the fluid, and the plates are carefully bolted and jointed.



GALVANIZED WROUGHT-IRON TANKS.

These Tanks are made to hold from 10 gallons upward.

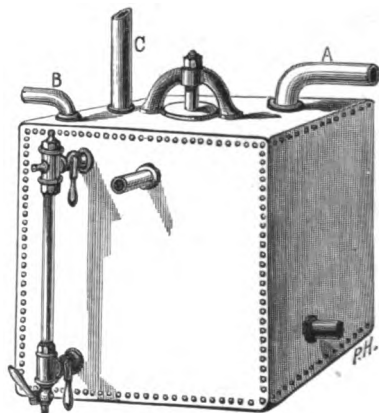
ESTIMATES GIVEN FOR TANKS TO HOLD ANY QUANTITY.

WEST AND DU VALLON'S WROUGHT-IRON CONDENSING TANK.

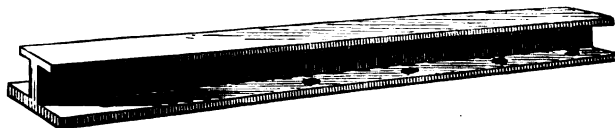
A valuable acquisition to every Boiler. The exhaust steam enters at A, and the cold water at B, any uncondensed steam escaping at C; water is heated to nearly boiling point before entering the Boiler; it is fitted with gauge to show water level and manhole for cleansing.



CONTRACTORS' CAST-IRON BOILING PAN FOR TAR, PITCH, &c.



CAST-IRON GIRDERS.



WEST AND DU VALLON are also manufacturers of Hoisting Crabs, Jib Cranes, Improved Bourdon Gauges for Steam, Hydraulic Pressure, or Vacuum.

WEST AND DU VALLON

(LATE SIEBE, WEST, AND CO.),

HYDRAULIC AND PNEUMATIC ENGINEERS, MILLWRIGHTS, COPPERSMITHS, &c.,
MASON STREET, WESTMINSTER BRIDGE ROAD, LONDON, S.E.
WORKS: BIRMINGHAM.

ESTABLISHED 1829.

MORGAN H. DAVIES,
WALKER'S PATENT CORRUGATED IRON WORKS,
ENGINEER AND CONTRACTOR.
CORRUGATED IRON MANUFACTURER,
PAINTED OR GALVANIZED.
CONTRACTOR TO H.M. WAR DEPARTMENT, &c., &c.

MANUFACTURER OF
ROOFS, WORKSHOPS, STORES, DWELLING HOUSES, CHURCHES, &c.,
IRON BRIDGES AND GIRDERS,
FIRE-PROOF DOORS, ENTRANCE AND OTHER GATES,
WROUGHT-IRON TANKS, PIPES, &c., &c.

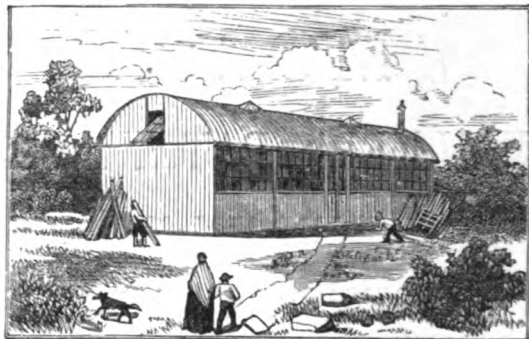
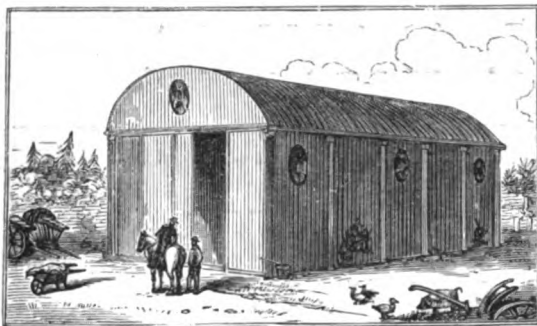
The cost of iron buildings varies so much that anything like a List of Prices cannot be given with any accuracy, but as an approximation it may be calculated that the cost of ordinary Curved Roofs, properly constructed, with tie rods, &c., complete, will be from £2 10s. to £6 per square; of Roofs framed in Wood or Iron, and covered with Corrugated Iron, will be from £5 to £10 per square; and that complete Iron Buildings cost from £4 10s. to £12 per square.

A Sketch and Estimate of the cost of any Roof, Shed, or Building, or other construction in Iron will be sent on receipt of particulars.

MORGAN H. DAVIES,
WALKER'S IRON WORKS, GRANGE ROAD, BERMONDSEY, LONDON.

CORRUGATED IRONWORK.

The great strength imparted to iron by corrugating it makes it especially suitable for Roofs of all spans, however large, and for exposed positions. The whole Roof being riveted together into one mass becomes a self-supporting arch, strong, light, and durable, with no loose slates or tiles to be blown away; and, being composed entirely of non-combustible materials, it is fire-proof.



For Export the advantage of using Corrugated Iron Buildings is very great. The buildings are prepared complete at these Works for erection abroad. They are carefully fitted to-



gether, punched, marked, and packed for shipment, and supplied with suitable drawings to facilitate the re-erection, which is thus rendered extremely simple for ordinary workmen.



DESIGNS AND ESTIMATES

FOR EVERY DESCRIPTION OF

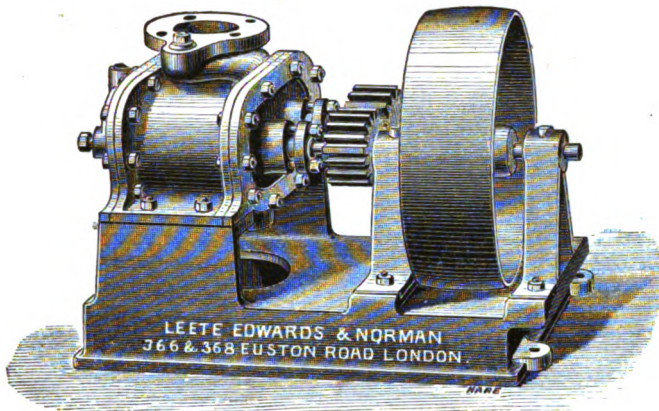
CORRUGATED IRON ROOFING, IRON BUILDINGS, OR OTHER IRONWORK

FURNISHED ON APPLICATION TO

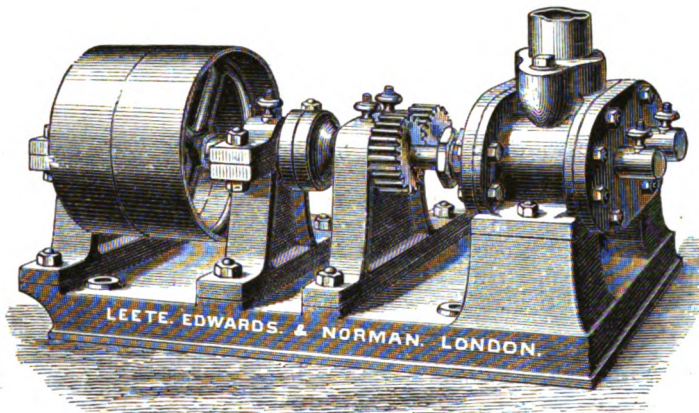
MORGAN H. DAVIES,

WALKER'S IRON WORKS, GRANGE ROAD, BERMONDSEY, LONDON.

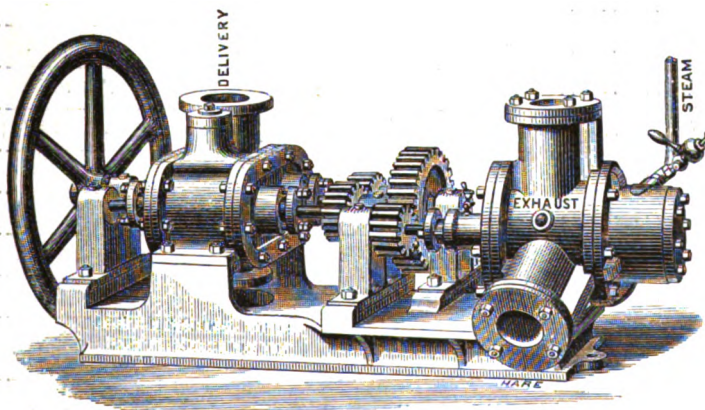
PATENT ROTARY PUMPS.



PUMP WITH SINGLE PULLEY.



PUMP WITH FAST-AND-LOOSE PULLEYS.

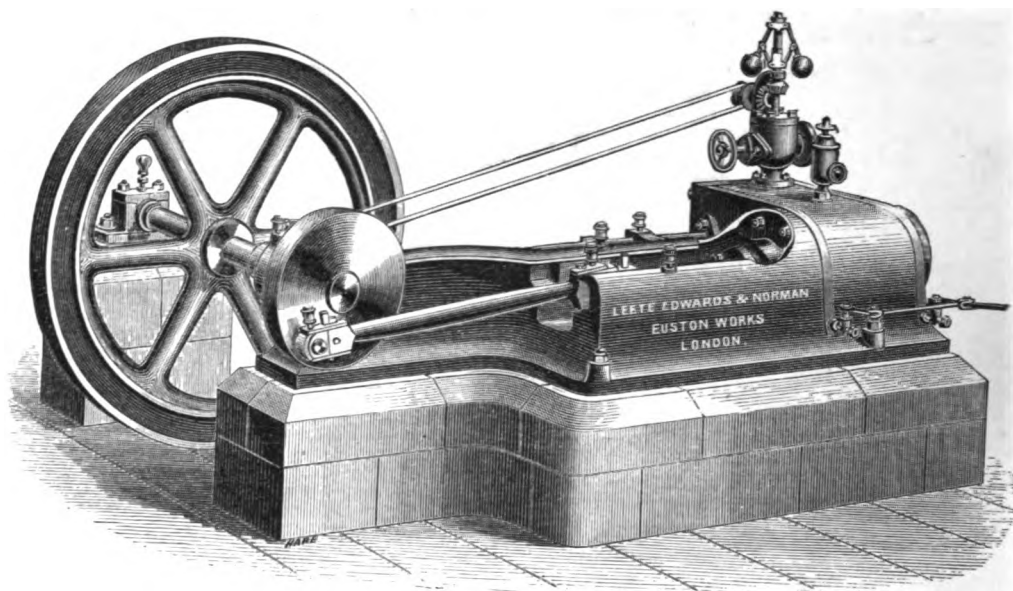


PUMP AND ENGINE COMBINED.

LEETE, EDWARDS, AND NORMAN,
ENGINEERS, EUSTON WORKS, 366 AND 368, EUSTON ROAD, LONDON, N.W.

3 H

HORIZONTAL HIGH-PRESSURE EXPANSIVE STEAM ENGINES.

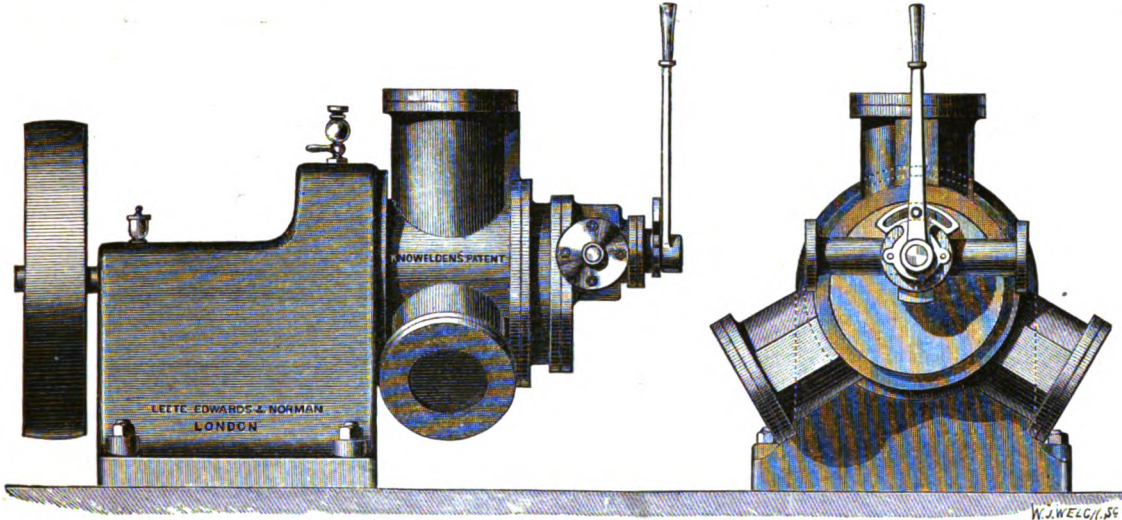


These Engines are made with the Bed Plate, front Cylinder Cover, Guides for Cross-head, and Plummer Block for Crank Shaft all in one casting. The Cylinder and Valve Chest are bolted on to the end of Bed Plate. The Cross-head, Guide Blocks, and Connecting Rod ends are adjustable, so that any wear can be very readily taken up. The Governor, Throttle Valve, and Starting Valve are combined, occupying but little space. The Governor is simple, compact, and sensitive. The Fly Wheel, Crank Shaft, and Disconnecting Rod, Cylinder Cover, Steam-Chest Cover, &c., &c., are all bright. The workmanship and materials are of the best throughout.

Size	1	2	3	4	5	6	7	8
Nominal Horse-power	1	2	3	4	6	8	10	12
Indicated Horse-power at 50 lb. pressure in Boiler, 240 feet per minute cut off at half-stroke	2	3.5	5.5	8.5	15	19	23.5	34.5
Diameter of Steam Cylinder	3 in.	4 in.	5 in.	6 in.	8 in.	9 in.	10 in.	12 in.
Length of Stroke	6 in.	8 in.	10 in.	12 in.	16 in.	18 in.	20 in.	24 in.
Revolutions per minute	240	180	144	120	90	80	72	60
Diameter of Fly Wheel	20 in.	30 in.	40 in.	48 in.	54 in.	60 in.	66 in.	72 in.
Weight of Fly Wheel	2 cwt.	12 cwt.	32 cwt.	62 cwt.	92 cwt.	132 cwt.	19 cwt.	22 cwt.
Approximate weight of Engine ..	52 cwt.	10 cwt.	15 cwt.	25 cwt.	34 cwt.	48 cwt.	62 cwt.	105 cwt.
Price of Engine	£34	£40	£48	£72	£93	£118	£150	£190
Feed Pump with Gun-Metal working parts, extra	£4	£4 5s.	£5	£6	£6 10s.	£8 10s.	£11	£15
Variable Expansion Gear, extra ..	..	..	£10	£12	£14	£14	£15	£16

LEETE, EDWARDS, AND NORMAN,
ENGINEERS, EUSTON WORKS, 366 AND 368, EUSTON ROAD, LONDON, N.W.

PATENT THREE-CYLINDER ENGINES,



W. J. WELCH, 1896

As Steam Engines, Hydraulic Engines, Gas Exhausters, Force Pumps, &c., &c.

In this Engine the strain on the Crank Shaft is rendered constant in all positions of the Crank, and thus uniformity of action is obtained in every part of the Machine without the use of a Fly Wheel. There is no dead point, and the Engine will start from any position. The Engine consists of three Cylinders; steam is admitted in rotation by a single Valve; there are no Guides, Piston Rods, nor Glands; the working parts are comprised in the Pistons, Connecting Rods, Crank Shaft, and Valve. The cubic space occupied by this Engine is from one-fifth to one-tenth of that required for an ordinary Horizontal Engine; owing to this, the cost of foundations and erection is proportionally reduced. In consequence of the few parts, the wear and tear is reduced to a minimum. No dirt can enter the Engine, as all the working parts are entirely enclosed and protected from injury, but at the same time so readily accessible that the Engine can be entirely dismantled and reconnected in a few minutes. The cost will be found to compare very favourably with all other types. From the general design and small compass, it possesses the advantage of great portability. The construction admits of high speed, and is therefore particularly adapted for driving Circular Saws, Winches, Hoists, Pumps, Fans, Engineers' Tools, and all kinds of Centrifugal Machines, also for Screw Propellers, &c., &c., attached direct without intermediate gear. The Valve may be arranged to *cut off* at any part of the Stroke. The above Engraving represents the Engine with Reversing Gear, but Governors may be substituted, and, if desired, with Variable Expansion Gear.

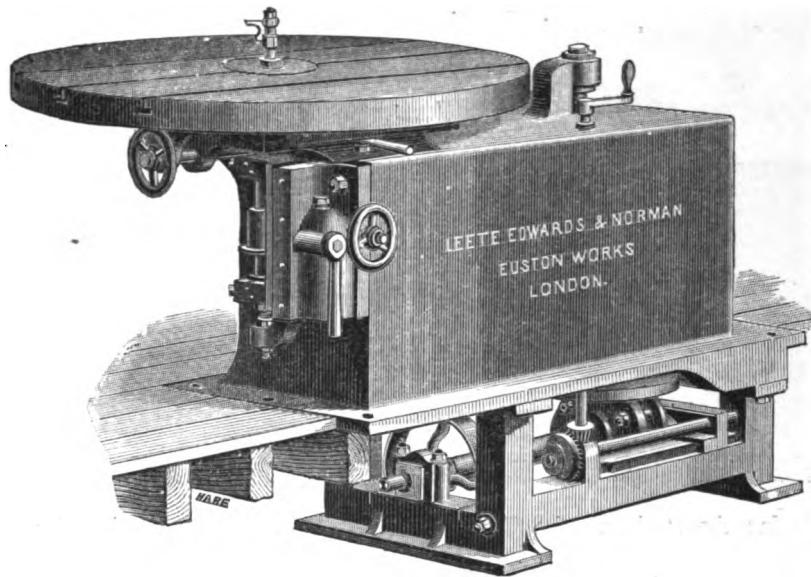
Indicated Horse-power at a Piston speed of 300 feet per minute, and a mean Steam Pressure of 40 lb. per square inch	7	11	15	21.	30	35
Diameter of Cylinder in inches	4 in.	5 in.	6 in.	7 in.	8½ in.	9 in.
Length of Stroke	3 in.	4½ in.	5 in.	6 in.	7 in.	8 in.
Price of Engine with Starting Valve	£30	£45	£60	£80	£105	£115
Extra for Reversing Gear or Governors	£8	£10	£10	£12	£12	£15

The Piston speed of 300 feet per minute is merely assumed to calculate the indicated power.

LEETE, EDWARDS, AND NORMAN,
ENGINEERS, EUSTON WORKS, 366 AND 368, EUSTON ROAD, LONDON, N.W.

3 H 2

IRREGULAR SHAPING AND MOULDING MACHINE.

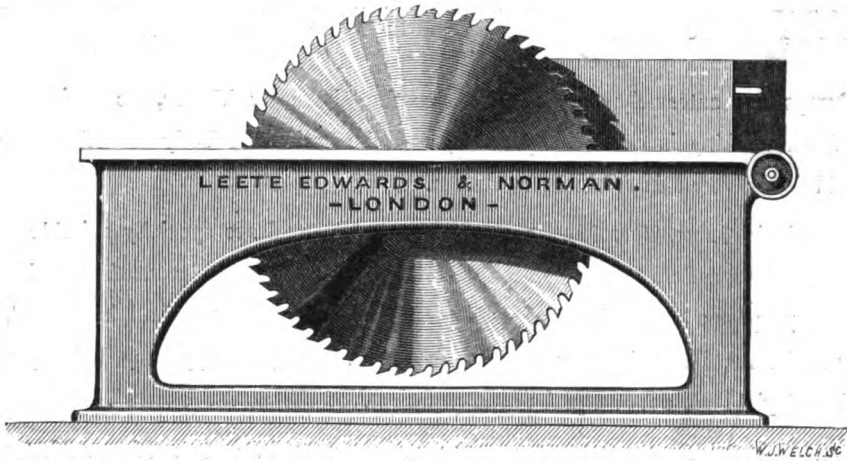


This Machine is well adapted for Planing, Moulding, Shaping, and Rebating all kinds of straight, curved, and irregular forms, and is expressly suitable for Cabinet Makers, Railway Carriage Shops, &c., &c. It has a Vertical Spindle carrying the Cutter, and the Spindle can be raised or lowered at pleasure from the hand-wheel at the right-hand side. The Cutter Spindle can be reversed, and the speed regulated by simply turning the handle (shown at top of Machine). The table top is provided with T grooves for readily setting any fence, &c. It is also adjustable from the hand-wheel in front, thus regulating the cut, a very important arrangement when cutting large mouldings, by which much time is saved and better work produced. There is a self-acting feed arrangement for straight mouldings; this can be lowered under the table when the Machine is required for other work. The whole is self contained, as shown above. Can be conveniently fixed either on floor or brickwork foundation, with all straps, &c., enclosed.

Full Particulars on application to

LEETE, EDWARDS, AND NORMAN,
ENGINEERS, EUSTON WORKS, 366 AND 368, EUSTON ROAD, LONDON, N.W.

SAW BENCHES.



The Main Frame of these Benches is all in one casting, by which great strength and stiffness are obtained. - The Bearings in which the Spindle runs are of extra length, and special arrangements made for lubricating. These Benches are fitted with Fast-and-Loose Pulleys, adjustable Fences, with canting arrangements for any angle.

Tables.	Average Power.	Diameter of Pulleys.	Speed of Saw Spindle.	Diameter of Saw.	To cut.	Price.
ft. in. ft. in. 3 6 x 2 0	1	inches. 9	revolut' ons. 1800	inches. 15	inches. 6	£ 22
4 6 „ 2 6	3	12	1500	24	9	28
5 6 „ 2 9	6	14	1000	36	14	38
6 0 „ 3 0	7	15	900	42	17	45
7 0 „ 3 6	8	16	800	48	20	55

MAKERS OF SPECIAL TOOLS FOR WOOD CUTTING.

ALSO

MACHINES FOR LUCIFER-MATCH MAKING

(BOTH WAX AND WOOD).

Full Particulars on application to

LEETE, EDWARDS, AND NORMAN,

ENGINEERS, EUSTON WORKS, 366 AND 368, EUSTON ROAD, LONDON, N.W.

PATENT ROTARY PUMPS.

SPECIALTY FOR TAR, OILS, SEMI-LIQUIDS, AQUARIA, &c., &c.

These Pumps are extremely simple in construction, have no Valves, no reciprocating parts; the friction when working is exceedingly small, and the action perfectly smooth, while the water or other liquid is delivered in a constant stream.

They are made in IRON, GUN METAL, **Vulcanite**, &c., and are specially suitable for pumping **Oils, Acids, Gas Tar, Dyes, Brewers' Wort**, also for **Vinegar Breweries**, and **Sea Water** for **Aquarium** purposes, &c., and are therefore adapted to the wants of all kinds of Traders and Manufacturers who require a simple and effective Pump. They occupy very little space, are very durable, and will yield an effect equal to 80 per cent. of the power exerted.

The undermentioned sizes are always either in stock, or in course of manufacture. Larger sizes can be made without impairing the efficiency. They are made with Single Pulley, Fast-and-Loose Pulleys, Steam Engine combined on the same Bed Plate with Pump, or can be arranged to be driven by other power.

No of Pump.	Diameter of Pipes, Suction and Delivery.	Gallons raised per hour.	Power to raise the said number of Gallons 1 foot high.*	Revolutions per minute.	Price of Pump in Iron with Fast-and-Loose Pulleys.	Price of Pump in Gun Metal with Fast-and-Loose Pulleys.	Price of Pump in Vulcanite with Fast-and-Loose Pulleys.	Price of Engine and Pump combined.
1	inches. 1	500	·004	250	£ 15	£ 19	£ 21	£ ..
2	2	2,000	·018	250	20	26	28	65
3	3	4,500	·037	200	30	40	42	..
4	4	7,500	·063	200	40	50	54	110
5	5	12,500	·105	150	50	..	..	..
6	6	18,000	·151	150	60	..	..	155

These prices may vary, depending on the size of Engine required.

NOTE.—If with additional Standard, Coupling Spindle and Coupling, £4 extra.

* To ascertain the power required for any height of lift, multiply the horse-power given in the fourth column of this Table by the height in feet above the source of supply, the product is the total horse-power required, unless the length of pipe or number of bends is very great, in which case a special calculation is necessary.

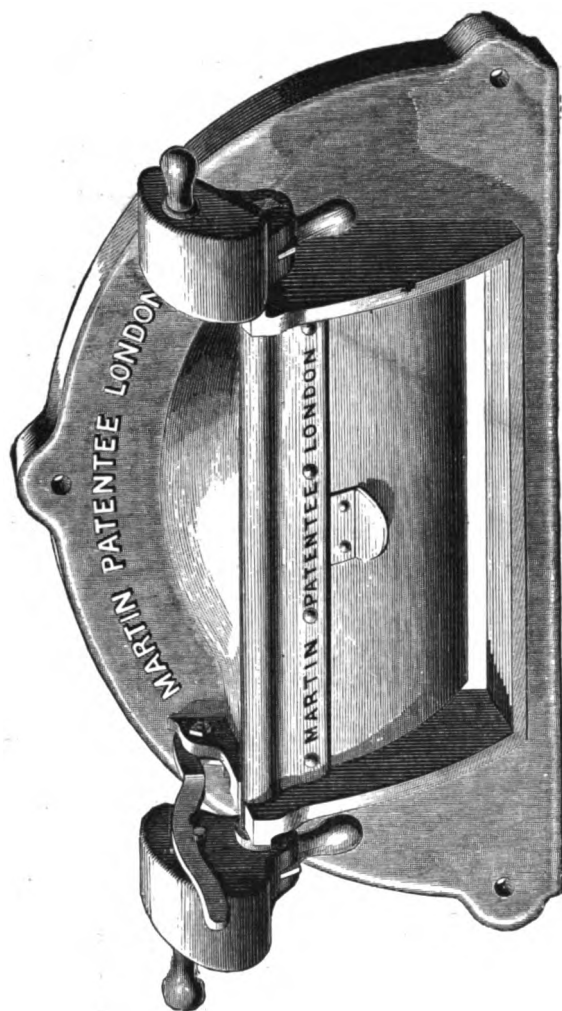
ALL KINDS OF VULCANITE COCKS AND FITTINGS FOR ACID WORKS,
AQUARIA, VINEGAR BREWERIES.

Full Particulars on application at the Works.

LEETE, EDWARDS, AND NORMAN,
ENGINEERS, EUSTON WORKS, 366 AND 368, EUSTON ROAD, LONDON, N.W.

W. A. MARTIN AND CO.'S PATENT SMOKE-CONSUMING FURNACE DOORS.

INCREASED STEAM POWER. PREVENTION OF SMOKE.



FOR ALL
FURNACES,
LAND OR
MARINE.

W. A. MARTIN AND CO.,
80, FLEET STREET, LONDON, E.C.

DOOR AND FRONT FOR EVERY DESCRIPTION
OF TUBULAR BOILERS.

No.	1	2	3	4	5	6
12 and under 14 in.	7	10	16	18	20	24
14	8	10	16	18	20	24
16	8	10	16	18	20	24
18	9	10	16	18	20	24
20	10	10	16	18	20	24
24	12	10	16	18	20	24
30	14	10	16	18	20	24

ECONOMY IN FUEL.

SQUARE FRAMED DOOR FOR FURNACES IN
BRICKWORK.

No.	22	23	24	25	26	27	28	29	30	31	32	33
7 in.	8	9	10	11	12	13	15	17	20	22	24	
8	2	3	3	4	5	7	8	9	10	11	12	
10	2	3	3	4	5	7	8	9	10	11	12	
12	2	3	3	4	5	7	8	9	10	11	12	
14	2	3	3	4	5	7	8	9	10	11	12	
16	2	3	3	4	5	7	8	9	10	11	12	
18	2	3	3	4	5	7	8	9	10	11	12	
20	2	3	3	4	5	7	8	9	10	11	12	
22	2	3	3	4	5	7	8	9	10	11	12	
24	2	3	3	4	5	7	8	9	10	11	12	
26	2	3	3	4	5	7	8	9	10	11	12	
28	2	3	3	4	5	7	8	9	10	11	12	
30	2	3	3	4	5	7	8	9	10	11	12	
32	2	3	3	4	5	7	8	9	10	11	12	
34	2	3	3	4	5	7	8	9	10	11	12	

DOOR WITHOUT FRAME, FOR FIXING TO
WROUGHT OR CAST FRONTS.

No.	7	8	9	10	11	12
12 and under 14 in.	6	7	8	9	10	12
14	6	7	8	9	10	12
16	6	7	8	9	10	12
18	6	7	8	9	10	12
20	6	7	8	9	10	12
24	6	7	8	9	10	12
30	6	7	8	9	10	12

SAVING OF LABOUR.

HORIZONTAL HIGH-PRESSURE STEAM ENGINES.

The materials and workmanship of these Engines are of the very best description, and the general arrangement of all the parts will be acknowledged to be improvements upon most of the Horizontal Engines at present offered to the public.

The Piston can be taken out at the back of the Cylinder, requiring to remove nothing in the front except the cross-head nut on end of Piston Rod. The Stuffing Box neck in front cover of Cylinder is made long, making a durable wearing surface. The Pistons are deep, and consequently lasting. The Piston Rods are Steel. All the Covers are fitted with forcing screws, to take them off easily when required, without wedges which much damage the joints. The Cylinders are sufficiently thick to allow of re-boring four times. The Guide Blocks are made long to last well. The Slide Rod has a very substantial guide outside the Stuffing Box. The Slide Box can be taken off to repair the Slide face when required without having to remove the Cylinder. All the joints are planed. The Slide Valve is so constructed that it cannot get out of order, and will wear well. The Pumps are bored all the way through, and the Valves arranged so as to get at quickly. All the forgings are made of faggoted iron. The working joints are all case-hardened. The Crank Shaft is of Wrought Iron, and can be reversed to which side of the Engine may be most convenient for the purchaser's premises. The Gun-Metal Bearings are stout and broad. Each Engine has Governors, Throttle Valve, and Feed Pump.

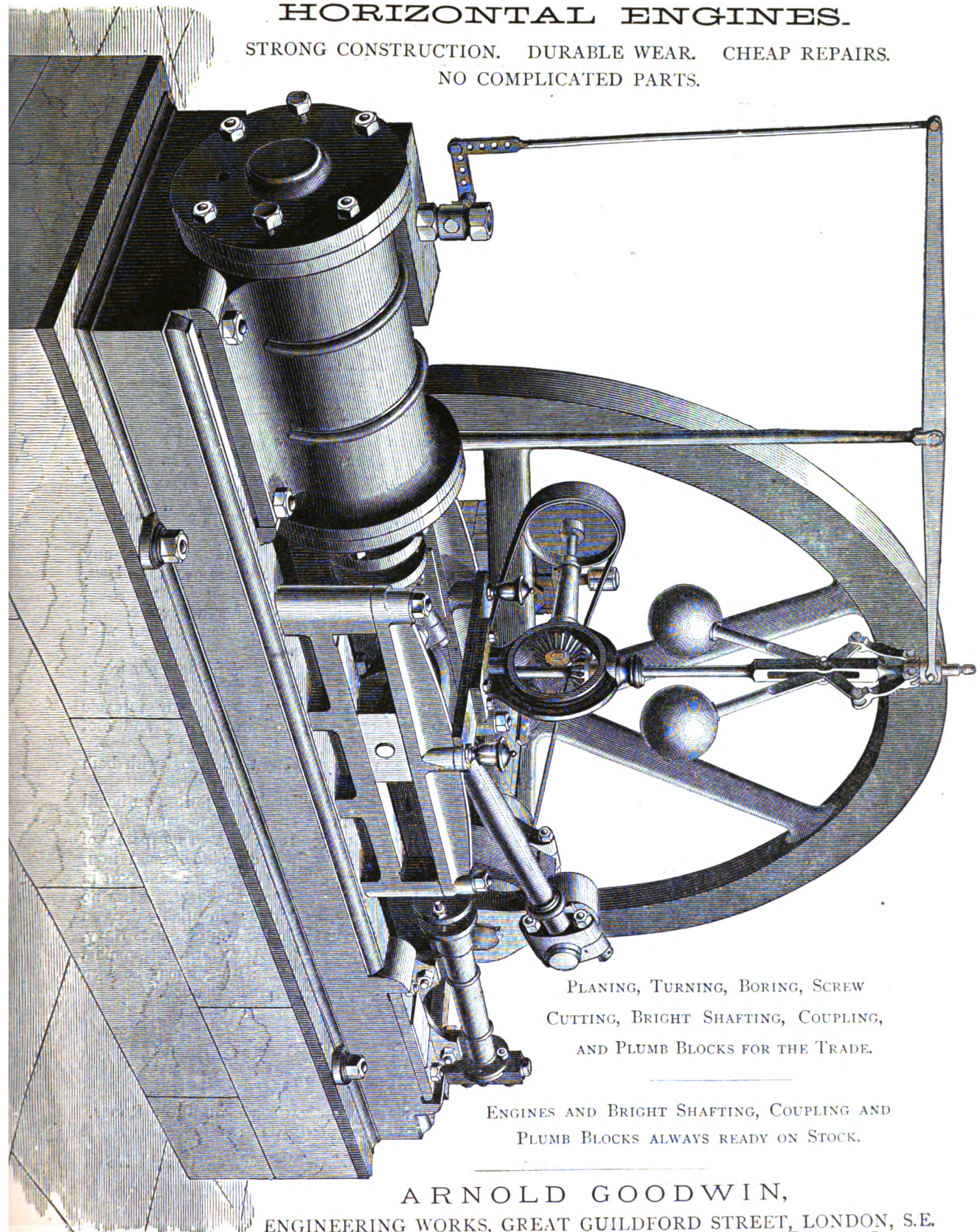
A number of these Engines can be seen at work in London.

Horse-power.	Diameter of Cylinder.	Length of Stroke.	Diameter of Crank Shaft.	Diameter of Fly Wheel.	Weight of Fly Wheel.	PRICE.
	inches.	inches.	inches.	feet. inches.	ton. cwt.	£
4	6½	13	2½	5 0	0 6	52
6	8½	15	3	5 6	0 9	75
8	9½	16	3½	6 0	0 12	92
10	10½	19	3½	7 6	0 15	115
12	11	20	3¾	8 0	0 18	138
14	12	22	4	8 6	1 0	154
16	13	24	4	8 6	1 7	172
20	14½	25	4½	9 0	1 10	200
25	16½	30	5	10 0	2 0	250

ARNOLD GOODWIN,
ENGINEERING WORKS, GREAT GUILDFORD STREET, SOUTHWARK, LONDON, S.E.

HORIZONTAL ENGINES.

STRONG CONSTRUCTION. DURABLE WEAR. CHEAP REPAIRS.
NO COMPLICATED PARTS.

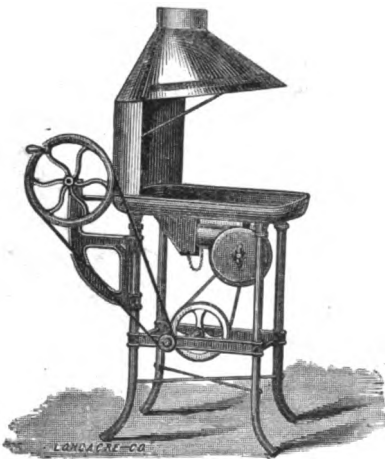
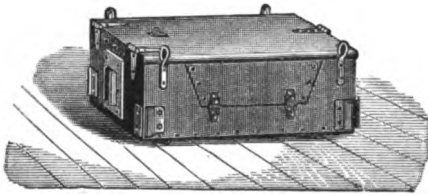
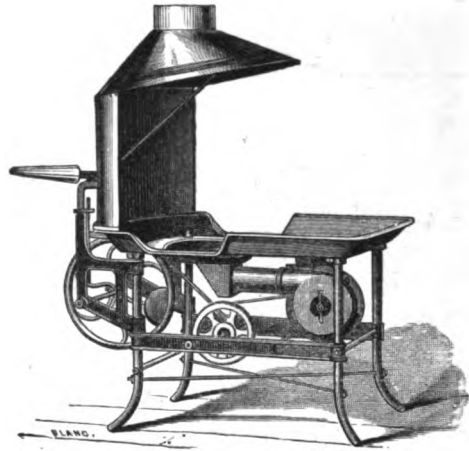
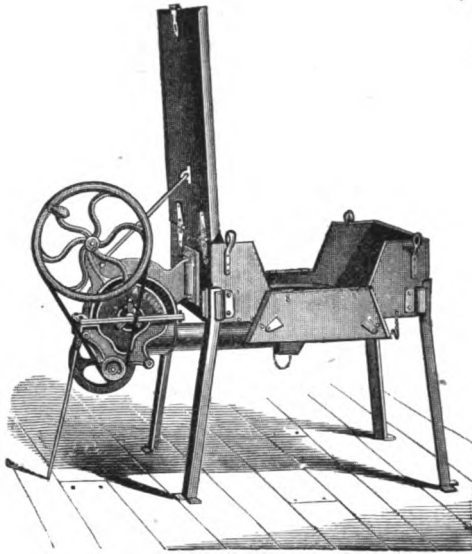


PLANING, TURNING, BORING, SCREW
CUTTING, BRIGHT SHAFTING, COUPLING,
AND PLUMB BLOCKS FOR THE TRADE.

ENGINES AND BRIGHT SHAFTING, COUPLING AND
PLUMB BLOCKS ALWAYS READY ON STOCK.

ARNOLD GOODWIN,
ENGINEERING WORKS, GREAT GUILDFORD STREET, LONDON, S.E.

KEYSTONE PATENT PORTABLE FORGES.



These Forges, which are now for the first time introduced into Europe, are in very general use in America, and possess many advantages over all other portable forges.

They are light, strong, durable, cheap, easily worked, and fill up but little space, and heat very rapidly.

Their fan-blast is more effective than the blast of any other forges, and is far superior in every respect to bellows.

They are made entirely of iron and steel, are fastened by bolts and nuts, and all parts are interchangeable.

The legs are of iron tubes, combining strength with lightness in the highest degree.

These Forges are especially adapted for out-door work, having no wood or leather to decay; their lightness and extreme portability render them exceedingly valuable for railway contractors' use, and iron bridge and roof building.

They are made in many different sizes, and with both lever and rotary motion.

The Navy Forge is especially adapted for use on board steamships. It packs in its own body, measuring only 22 inches $\times$ 27 inches $\times$ 10 inches. Is capable of producing a quick welding heat on 3-inch round iron, and can be set up for work or packed for transport in one minute. Like all other Keystone Forges, it has no leather or wood to decay, as it almost invariably does on board ships. These are in use in the United States Navy, and are also especially adapted for Army purposes, mining, and rough work generally. These Forges may be seen in work at 225, Upper Thames Street, London.

ROWNSON, DREW, AND CO.,

WHOLESALE AND EXPORT IRONMONGERS;

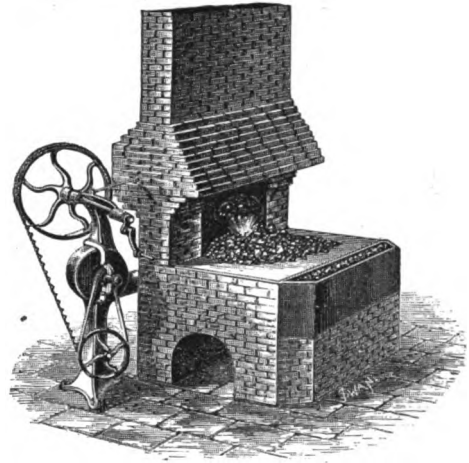
DEALERS IN CONTRACTORS' TOOLS, PLANT, AND STORES; AND CONTRACTORS FOR IRON ROOFS, BRIDGES, GIRDERS, AND IRON CONSTRUCTION GENERALLY:

225, UPPER THAMES STREET, 113, QUEEN VICTORIA STREET, AND PAUL'S WHARF, LONDON, E.C.

CYCLOPS PATENT BLOWERS.

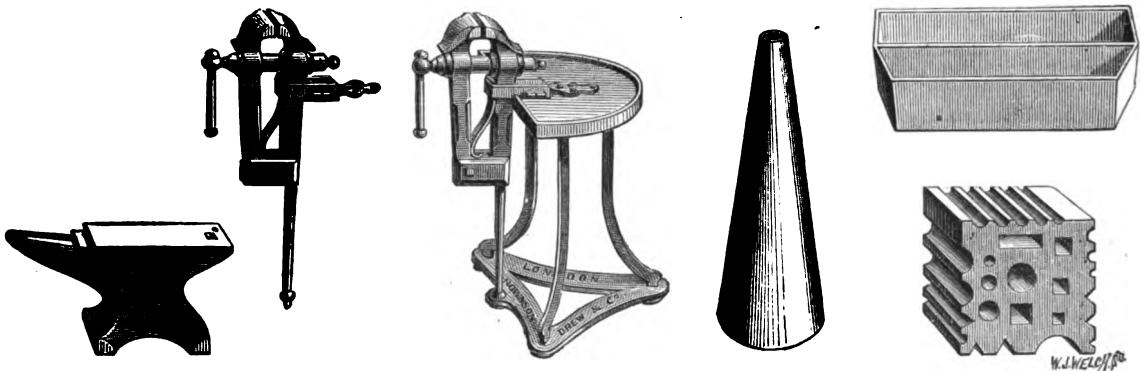
(Patented June, 1873.)

These Blowers are very compact and powerful. They are very easily fixed to any ordinary Brick Forge, and can be used either with the Patent Tuyere or with an ordinary Forge back. They take up much less room than bellows, are more easily worked, and have no leather or wood to decay. They can be worked either by hand, treadle, or overhead pulley, are fitted with Improved Patent Lubricators, geared with either chain or belt, and are made right and left hand—the Drawing shows the latter.



PRICE COMPLETE, WITH TUYERE, £7.

CAN BE SEEN IN WORK AT 225, UPPER THAMES STREET.



SMITHS' TOOLS OF ALL DESCRIPTIONS IN STOCK.

ROWNSON, DREW, AND CO.,

WHOLESALE AND EXPORT IRONMONGERS;

DEALERS IN CONTRACTORS' TOOLS, PLANT, AND STORES; AND CONTRACTORS FOR IRON ROOFS, BRIDGES, GIRDERS, AND IRON CONSTRUCTION GENERALLY:

225, UPPER THAMES STREET, 113, QUEEN VICTORIA STREET, AND PAUL'S WHARF, LONDON, E.C.

PRICE LIST, JANUARY, 1875.

BLACKSMITHS' FORGES.

ROTARY.	Height.	Size of Fire Pan.	Weight.	Diameter of Fan.	Price.		
	inches.	inches.	lb.	inches.	£	s.	d.
Forge No. 1	30	17 X 20	85	6	5	10	0
Forge No. 1, with Hood	30	17 „ 20	88	6	6	0	0
Forge No. 2	30	20 „ 24	98	8	7	0	0
Forge No. 2, with Hood	30	20 „ 24	104	8	8	0	0
Forge No. 2½	25	21 „ 27	130	8	9	0	0
Forge No. 2½, with Hood	25	21 „ 27	140	8	10	0	0
Forge No. 3	25	24 „ 30	140	9	10	0	0
Forge No. 3, with Hood	25	24 „ 30	150	9	11	5	0
LEVER.							
Forge No. 2½, with Lever	25	21 „ 27	140	8	10	0	0
Forge No. 2½, with Lever and Hood	25	21 „ 27	150	8	11	0	0
Forge No. 3, with Lever	25	24 „ 30	150	9	12	0	0
Forge No. 3, with Lever and Hood	25	24 „ 30	160	9	13	5	0
Forge No. 4, with Lever	25	30 „ 40	185	9	14	0	0
Forge No. 4, with Lever and Hood	25	30 „ 40	200	9	15	15	0
POWER.							
Forge No. 2½, for Power, with Hood	25	21 „ 27	140	8	10	0	0
Forge No. 3, for Power, with Hood	25	24 „ 30	150	9	12	0	0
Forge No. 4, for Power, with Hood	25	30 „ 40	200	9	15	0	0
Forge No. 5 (oval)	22	36 „ 54	550	9	29	0	0
Forge No. 6 (circular)	22	54 „ 54	600	9	32	0	0

If above fitted with Chain Gear, 10s. to 15s. extra.

JEWELLERS' FORGES.

Forge No. 1, with Close Hood	30	17 X 20	94	6	6	15	0
Forge No. 2, „ „ „	30	20 „ 24	110	8	9	0	0

MINERS' AND NAVY FORGES.

Miners' Forge (Chain Gear)	..	16 X 22	100	6	10	0	0
Navy Forge (W.-iron Box), Chain Gear	22	22 X 27	200	9	16	0	0

FAN BLOWERS.

Fan Blower No. 1. For Round Belt	6	1	12	6
Fan Blower No. 2. „ „ „	8	2	0	0
Fan Blower No. 3. For 1-inch Flat Belt	9	2	10	0
Fan Blower No. 4. „ „ „	10	2	15	0
Fan Blower No. 6. For 2-inch Flat Belt	16	5	0	0

BELTING.

Twisted Leather Belting, with hook and eye per Belt	0	2	6
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ROWNSON, DREW, AND CO.,

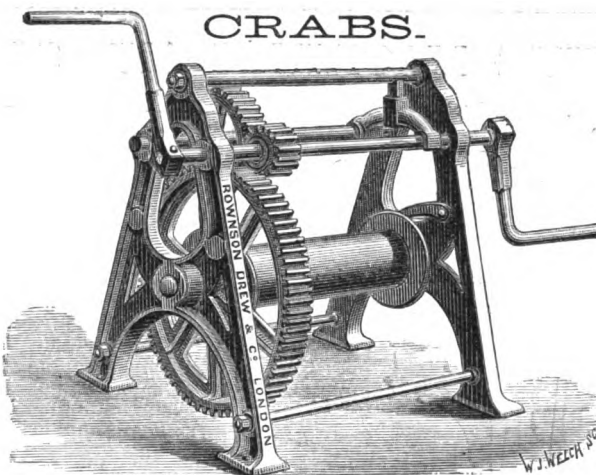
WHOLESALE AND EXPORT IRONMONGERS,

225, UPPER THAMES STREET, 113, QUEEN VICTORIA STREET, AND PAUL'S WHARF, LONDON, E.C.

SINGLE PURCHASE.

Size.	Will lift with 2 to 3 Sheave Blocks.	Price.
		£ s. d.
1	2 Tons.	3 0 0
2	3	3 7 6
3	4	4 5 0
4	5	5 0 0
5	6	6 5 0
6	9	7 5 0

Brass Bushed, 25s. extra.

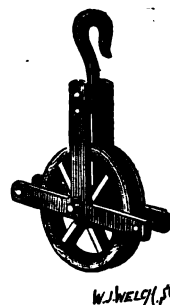
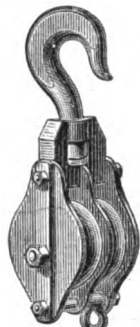
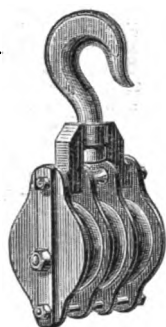


DOUBLE PURCHASE.

Size.	Will lift with 2 to 3 Sheave Blocks.	Price.
		£ s. d.
10	4 Tons.	5 5 0
11	5	6 0 0
12	6	7 7 6
13	9	8 5 0
14	12	10 0 0
15	15	13 12 0
16	18	17 5 0
17	24	21 0 0

Brass Bushed, 2 to 4 Tons,
27s. 6d.; 6 to 8, 35s.;
10 to 16, 40s. extra.

VERY BEST TOWN MADE BLOCKS.



	3 in.	3½ in.	4 in.	4½ in.	5 in.	6 in.	7 in.	8 in.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Single.. ..	9 6	12 6	15 0	17 0	21 0	26 6	37 0	48 0
Double	12 0	15 0	17 0	21 0	26 6	37 0	53 0	69 0
Treble	14 0	17 0	20 0	27 6	32 0	48 0	63 0	90 0
Snatch	14 0	17 0	22 6	24 0	29 0	34 0	42 6	53 0

Mounted Rubbish Wheels, 10 in., 8s.; 12 in., 8s. 6d.; 14 in., 9s. 6d.; 16 in., 11s.; 18 in., 13s.; 20 in., 14s. 6d.

LIFTING JACKS.

IMPROVED TRAVERSING JACK.

No.	Height when down.	Will traverse.	Will lift.	Price.
				£ s. d.
1	20 in.	6½ in.	6 Tons.	6 10 0
2	24	9	8	7 0 0
3	26	12	12	7 15 0
4	27	16	15	9 15 0
5	27	22	20	12 5 0

HALEY'S PATENT.

No.	Will run out.	Will lift.	Price.
			£ s. d.
1	13 in.	2 Tons.	4 10 0
2	13	4	5 0 0
3	13	6	5 15 0
4	13	8	7 0 0
5	13	10	8 0 0
6	14	12	9 0 0
7	14	16	15 0 0
8	15	20	18 10 0

TRIPOD BOTTLE JACKS.

No.	Height when down.	Will lift.	Price.
			£ s. d.
1	9 in.	1½ Tons.	1 4 0
2	12	2	1 7 6
3	15	3	1 12 0
4	18	4	1 18 6
5	21	5	2 5 0
6	24	6	3 0 0
7	27	8	3 13 0
8	30	10	4 10 0
9	33	12	5 10 0
10	36	14	6 7 6
11	42	16	6 17 6
12	48	18	7 15 0

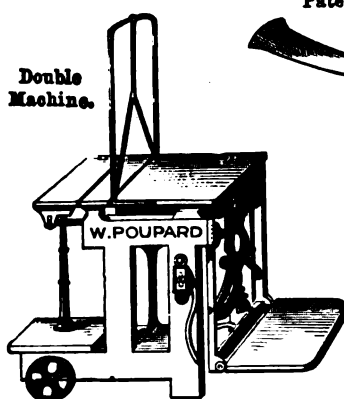
TIMBER AND STONE JACKS.

SINGLE PURCHASE, 2 TONS.		DOUBLE PURCHASE, 4 TONS.	
Feet.	£ s. d.	Feet.	£ s. d.
2	3 5 0	2½	5 18 6
2½	3 10 0	3	6 5 0
3	3 15 0		

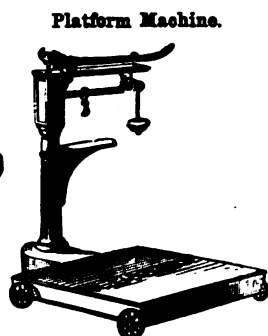
ROWNSON, DREW, AND CO.,

225, UPPER THAMES STREET, 113, QUEEN VICTORIA STREET, AND PAUL'S
WHARF, LONDON, E.C.

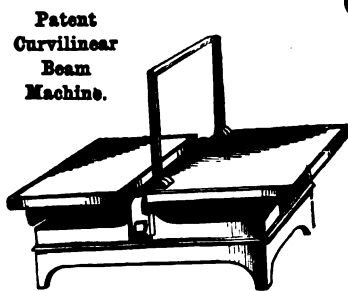
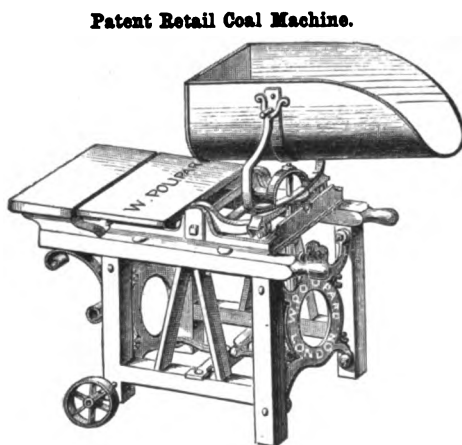
WEIGHING MACHINES AND SCREEN.

Double
Machine.

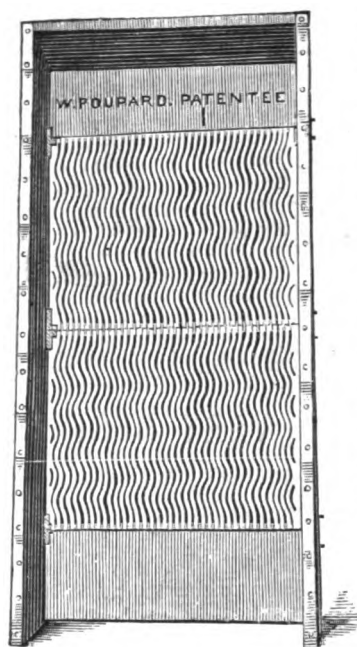
Patent Wheel Skid.



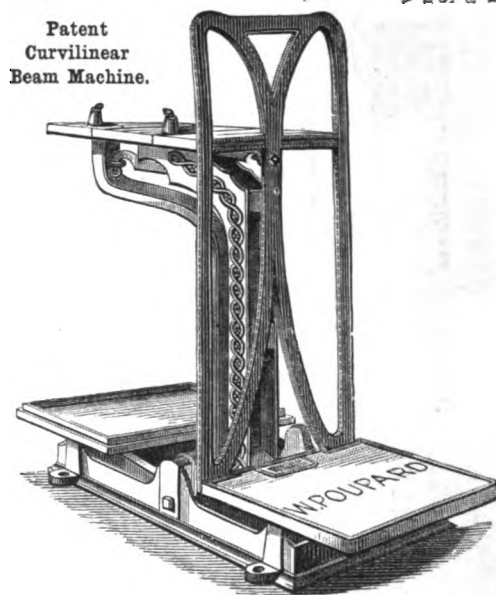
Platform Machine.

Patent
Curvilinear
Beam
Machine.

Patent Retail Coal Machine.



PATENT SERPENTINE SCREEN, FOR COAL, GRAVEL, &c.—Its advantages are many; suffice it to say, almost indestructible, it can be regulated to any mesh, from $\frac{1}{4}$ inch to $1\frac{1}{2}$ inch, thus making SEVEN SCREENS IN ONE FRAME; they screen much cleaner, more uniformly, and will not choke up; and, in fact, possess every improvement and requisite that must ultimately make them generally acknowledged to stand unrivalled.

Patent
Curvilinear
Beam Machine.

EVERY DESCRIPTION OF SCALES, WEIGHTS, PLATFORM AND OTHER WEIGHING MACHINES.
SHOVELS of all kinds suitable for Coal Merchants, Builders, and Contractors.
SACKS, SACK TRUCKS, HEAVING STICKS, PROP STICKS, LEVERS, TOMAHAWKS, SIEVES, &c.

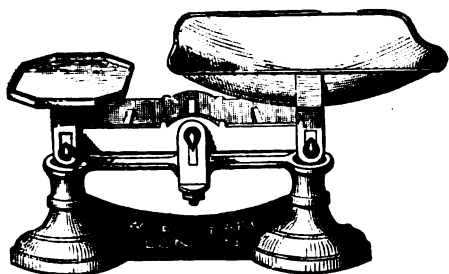
Agents for Patent Steel Shovels.

Patentees of the Safety Curvilinear Wheel Skid (the Life Saver).

WILLIAM POUPARD AND SONS,
PATENTEEES AND MANUFACTURERS,
7, BLACKFRIARS ROAD, AND COLLINGWOOD STREET, LONDON, S.E.

SCALES AND WEIGHING MACHINES.

COUNTER MACHINE.

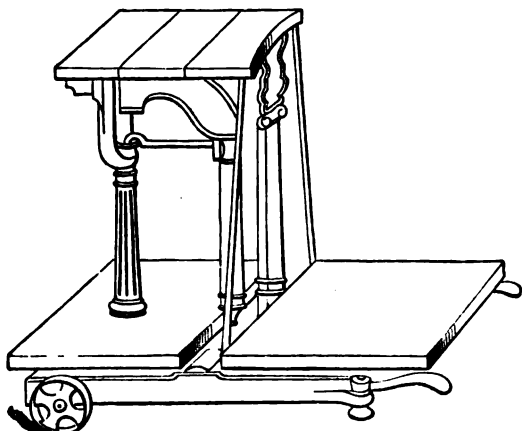


WITH OBLONG TIN SCALE.

7 lb.	14 lb.	28 lb.	56 lb.	112 lb.
19s.	21s. 6d.	26s.	31s.	45s. 6d. 57s. 6d.

Also with Tinned Copper Scale.

COTTON MACHINE.

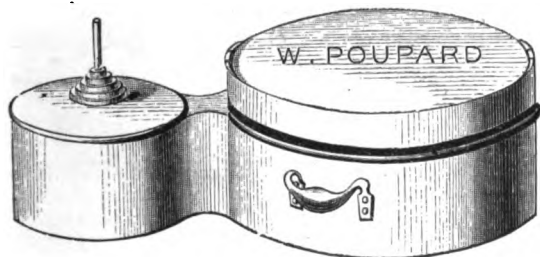


INVERTED MACHINE, WITH IRON PLATES OR
WOODEN BOARDS FOR CASKS.

May be had with Wings, for Bales of Cotton or
other bulky goods.

To weigh	3 cwt.	5 cwt.
Price	£3 12s.	£6 os. £7 4s.
To weigh	15 cwt.	20 cwt.
Price	£17 12s.	£22 13s. 6d.

IMPERIAL MACHINE.



IMPERIAL CRAFT WEIGHING MACHINE,

For weighing Coals or any other article of
stipulated weight, out of Barges, Trucks, &c.

To weigh 2 cwt., £7 3s.

WILLIAM POUPARD AND SONS,

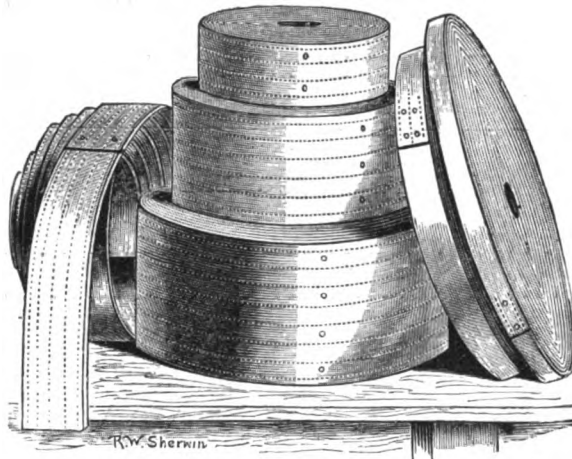
PATENTEES AND MANUFACTURERS,

7, BLACKFRIARS ROAD, AND COLLINGWOOD STREET, LONDON, S.E.

HEPBURN AND GALE, LONG LANE, SOUTHWARK, LONDON, S.E., TANNERS,

MANUFACTURERS OF WIRE-SEWN AND OTHER

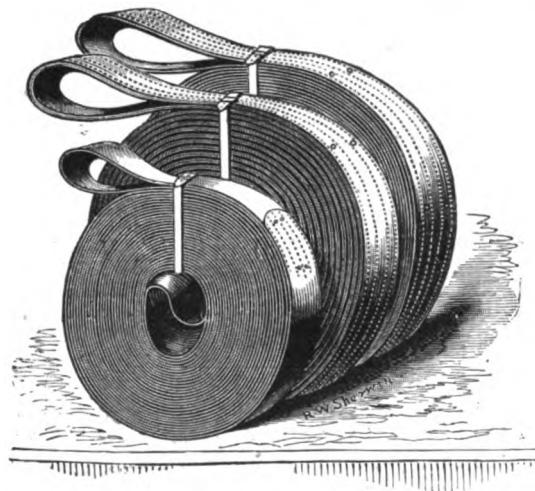
**LEATHER
MACHINE
BANDS,**



**LEATHER
HOSE
PIPES,**

CUP AND HYDRAULIC LEATHERS,

**PREPARED HIDE LACES,
STRAP BUTTS,
SOLE BUTTS,
PIPE BUTTS,
Walrus and
Hippopotamus
HIDES,
AND
LEATHER GOODS**
for all Mechanical
purposes,
and for Ships' use.



THEIR "COMPOSITE"
DOUBLE BAND OF
LEATHER AND
PREPARED HIDE
WILL BEAR MORE
STRAIN THAN ANY
OTHER BAND, AND
WILL STRETCH MUCH
LESS.

SINGLE, DOUBLE, AND COMPOSITE WIRE-SEWN LEATHER BANDS FOR PORTABLE ENGINES.

Their **WATERPROOF LEATHER** FOR PUMP BUCKETS retains its shape, and remains perfectly solid in water. It is in general use in Mines and Collieries, and may be had of all Dealers in Leather. Each Butt bears the following stamp:



**HEPBURN AND GALE,
LONG LANE, SOUTHWARK, LONDON, S.E.**

CATER AND WALKER,

GROVE STEAM BOILER WORKS,
SOUTHWARK, LONDON, S.E.

MANUFACTURERS OF

CATER AND WALKER'S PATENT BOILER.

LONDON UNIVERSAL EXHIBITION,
1862.

MACHINERY ANNEXE.

1 50 Horse-power.

2 40 „



VIENNA UNIVERSAL EXHIBITION,
1873.

BOILER HOUSE FOR
ENGLAND.

1 50 Horse-power.

ALSO OF

CORNISH, LANCASHIRE, MARINE, LOCOMOTIVE, VERTICAL, AND PORTABLE
BOILERS OF EVERY DESCRIPTION.

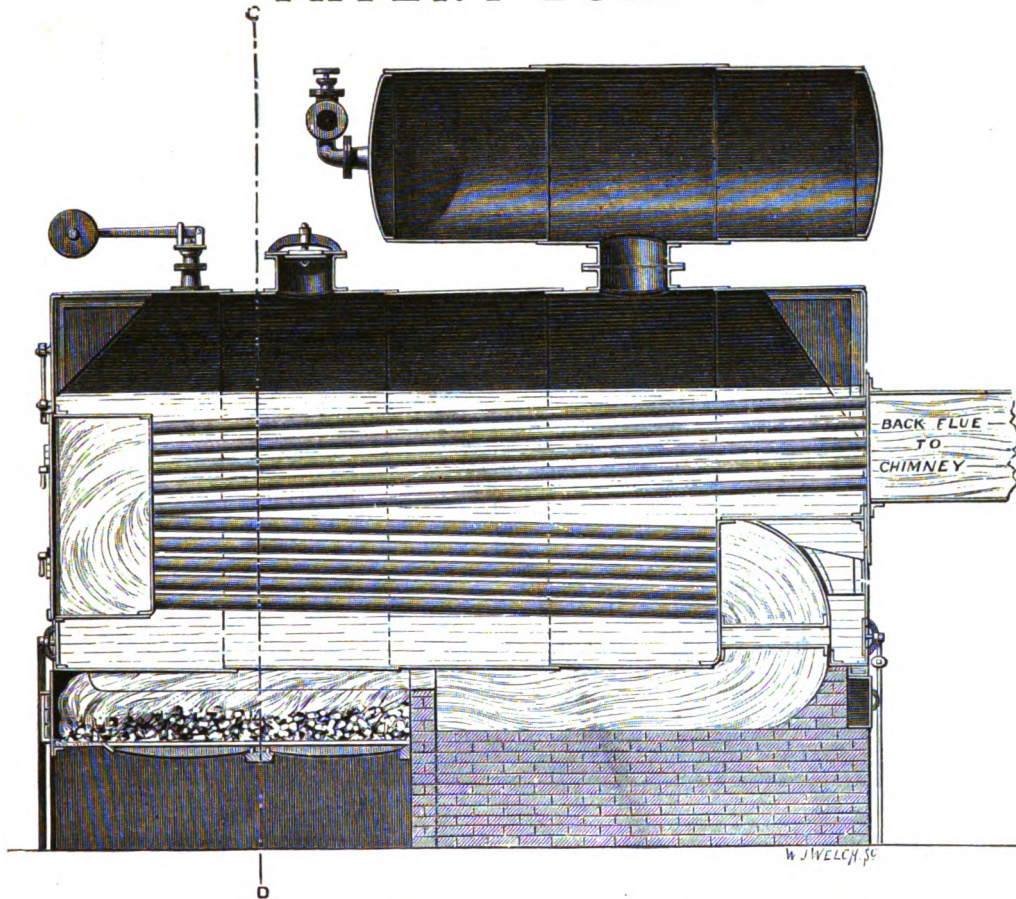
TAR, NAPHTHA, AND OIL STILLS; SOAP, SUGAR, SALTPETRE,
AND GLUE PANS; TANKS; GALVANIZING BATHS.

STEAM FITTINGS AND BOILER MOUNTINGS.

Testimonials and all particulars may be obtained on application to the Patentees,

CATER AND WALKER,
GROVE STEAM BOILER WORKS, SOUTHWARK, LONDON, S.E.

PATENT BOILER.



SECTION THROUGH A-B

ADVANTAGES.

SAFETY.—Nearly 600 of these Boilers have been in use for many years, and *not the slightest accident, much less an explosion*, has ever happened to one of them.

RAPID GENERATION OF STEAM.—Steam of 60-lb. pressure can be easily raised from cold water in one hour, and can be maintained with

THE GREATEST ECONOMY IN FUEL, evaporating upwards of 10 lb. of water per 1 lb. of coal: this result in many cases having been exceeded. The temperature of the gases as they leave the Boiler is rarely higher than 380° to 400° Fahrenheit. It may be mentioned that one of the first of these Boilers evaporated 9·6 lb. of water per 1 lb. of small coal, since which we have made many important improvements, and recent experiments show still better results.

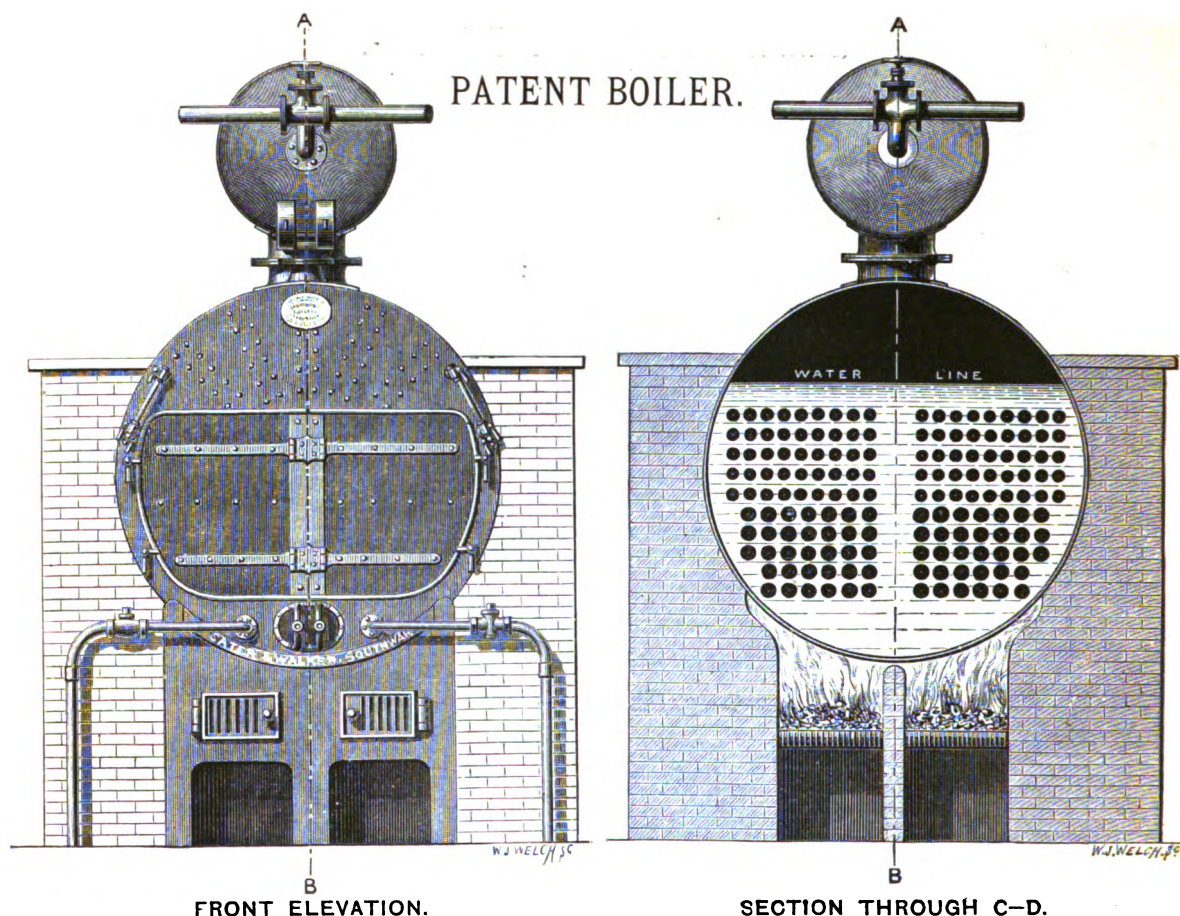
DURABILITY.—Many have been worked upwards of ten years without costing one shilling for repairs, the expansion and contraction of the Boiler while working being equal throughout.—*Vide Testimonials.*

ACCESSIBILITY.—Every part can be readily reached for the purpose of repair (when it eventually becomes necessary), and also for cleaning, the arrangement of parts being such that the whole of the interior can be as easily cleaned as that of any ordinary Boiler.

OCCUPIES VERY LITTLE SPACE.—A Boiler capable of evaporating 100 cubic feet of water per hour occupies a total ground space, including all brickwork and space at back end for smoke box, of 207 square feet, while Lancashire Boilers of the usual standard size capable of doing the same work require about 720 square feet. It consequently follows that the cost of brickwork setting necessary for our Boilers is very much less.

ADAPTED FOR BURNING ANY REFUSE AS FUEL.—Perfect combustion can be obtained under these Boilers, which cannot possibly be the case in the narrow and contracted flue tubes of the ordinary Boiler. To this may be attributed in a great measure the extraordinary economy attained when burning coal, while the area of the grate can be proportioned to suit any refuse fuel such as tan, sawdust, chips, shavings, refuse wood, megass, straw, &c. Indeed, many of these Boilers are at present in use in large saw mills, burning sawdust entirely, coal only being used in the majority of cases for

CATER AND WALKER,
GROVE STEAM BOILER WORKS, SOUTHWARK, LONDON, S.E.



ADVANTAGES—continued.

lighting up. Consequently the great saving thus effected has induced most of the principal saw mills proprietors and tanners in London to adopt them, and they have in all cases given complete satisfaction; while for shipment abroad to localities where fuel is bad and scarce they have been extensively used.

AN ENTIRE ABSENCE OF PRIMING GUARANTEED.—An ample proportion of steam space is provided, and priming is entirely prevented by the anti-priming arrangements adopted.

GREAT SAVING IN FREIGHT.—For shipment abroad these Boilers are peculiarly adapted, not only for their economy in fuel, as above mentioned, but the space occupied on board ship being about one-half what is required for ordinary Boilers, the saving in freight more than repays the additional first cost.

We are justified in stating these Boilers to be the *best and cheapest* in the market, as, although the cost is higher in the first instance than that of ordinary Boilers, yet the *cost of fixing* is not only *lower*, but the *great economy in fuel* will in a very short time amply repay the additional outlay; in fact, in many instances *the total first cost has been repaid within twelve months in the saving in fuel*. The cost for maintenance and repairs is considerably less, as there is no unequal expansion and contraction whatever in these Boilers, while with ordinary care they may be worked with even the worst water without fear of any evil results.

Of their safety in working nothing more need be said than that no accident has yet happened to one of them, which cannot be said of any other class of Boiler yet brought out.

During a series of careful experiments made by T. Box, Esq., C.E., author of 'A Practical Treatise on Heat,' &c., &c., on a 40 horse-power Boiler, it was found in *continuous trials* that with Derbyshire coal of inferior quality, 40 cubic feet of water at 70° were evaporated per hour to steam of 60-lb. pressure, the rate of evaporation being 8.4 lb. of water per lb. of coal; the gases leaving the boiler at a temperature of 400°. With Newcastle coal 10 lb. of water were evaporated per 1 lb. of coal, and with Welsh coal 11.8 lb.

The draught of this Boiler, though fair, was far from good, but it was found possible to work the Boiler with the refuse of the saw mill mixed with small coal, up to its full power, *i. e.* a constant evaporation of 40 cubic feet of water per hour to steam at 60 lb.

CATER AND WALKER,
GROVE STEAM BOILER WORKS, SOUTHWARK, LONDON, S.E.

CATER AND WALKER,

GROVE STEAM BOILER WORKS,

SOUTHWARK, LONDON, S.E.

PRICE LIST

OF

PATENT MULTITUBULAR BOILERS.

Horse-power.		Diameter. ft. in.		Length. feet.		Price. £	
12	....	4	6	8	....	185	net cash.
16	....	5	0	8	....	245	"
20	....	5	6	10	....	285	"
25	....	5	6	11	....	315	"
30	....	6	0	12	....	360	"
40	....	6	6	13	....	445	"
50	....	7	0	14	....	520	"
60	....	7	0	15	....	580	"
80	....	7	6	16	....	650	"
100	....	8	0	17	....	830	"

DELIVERY IN LONDON.

These Boilers are made on our Patent plan, as per accompanying description ; are of the very best material and workmanship ; and are supplied complete with the following fittings and apparatus, all fitted to the Boilers, and ready to be attached, viz. manhole and mudhole covers and cross bars, cast-iron furnace front and doors, with wrought-iron stays to build into the brickwork, cast-iron dead plate, bearing and furnace bars, back soot door, straight smoke box, 3 feet long, to lead into flue (any extra length or different shape to be extra), fitted with soot door and damper with weight and chain. Also with double safety valve, steam stop valve, with wrought-iron faced flanged necks to attach same to, riveted to Boiler ; two water indicators with spare glasses and indiarubber rings, two blow-off cocks and spanners, feed check valve, and patent steam-pressure gauge.

Longitudinal Steam Chambers of large capacity are provided for all Boilers over 30 Horse-power.

ABOVE PRICES SUBJECT TO ALTERATION AND SPECIAL TERMS.

Testimonials and all particulars may be obtained on application to the Patentees,

CATER AND WALKER,
GROVE STEAM BOILER WORKS, SOUTHWARK, LONDON, S.E.

CATER AND WALKER,
GROVE STEAM BOILER WORKS,
SOUTHWARK, LONDON, S.E.

ADVANTAGES
OF
CATER AND WALKER'S PATENT BOILER.

SAFETY.

RAPID GENERATION OF STEAM.

GREATEST ECONOMY IN FUEL YET ATTAINED.

DURABILITY.

ACCESSIBILITY.

OCCUPIES LITTLE SPACE.

COST OF FIXING SMALL.

ADAPTED ESPECIALLY FOR BURNING REFUSE FUEL.

ENTIRE ABSENCE OF PRIMING.

NEARLY 600 IN USE IN EVERY PART OF THE WORLD, GIVING
THE GREATEST SATISFACTION.

CATER AND WALKER,
GROVE STEAM BOILER WORKS, SOUTHWARK, LONDON, S.E.

CATER AND WALKER,

GROVE STEAM BOILER WORKS,

SOUTHWARK, LONDON, S.E.,

ARE ALSO MANUFACTURERS OF EVERY DESCRIPTION OF

CORNISH AND LANCASHIRE BOILERS,

MARINE BOILERS,

STEAM LAUNCH BOILERS OF SPECIAL DESIGN,

PATENT VERTICAL BOILERS,

VERTICAL BOILERS, WITH FIELD, VERTICAL, OR
CROSS TUBES,

LOCOMOTIVE AND PORTABLE BOILERS.

TAR, NAPHTHA, AND OIL STILLs.

SOAP, SUGAR, SALTPETRE, AND GLUE PANS.

TANKS OF EVERY DESCRIPTION.

GALVANIZING BATHS.

&c., &c.

HOT-WATER BOILERS OF SPECIAL DESIGN,

AS SUPPLIED TO

THE CRYSTAL PALACE, SYDENHAM; CITY PRISON, HOLLOWAY, &c. &c.

STEAM FITTINGS AND BOILER MOUNTINGS.

CATER AND WALKER,

GROVE STEAM BOILER WORKS, SOUTHWARK, LONDON, S.E.

The only Gold Medal awarded for Superiority at the International Exhibition,
Moscow, Russia.



LEROY'S IMPROVED PATENT NON-CONDUCTING COMPOSITION, FOR COATING BOILERS, STEAM PIPES, AND OTHER HIGHLY-HEATED SURFACES.

Much superior to Felt or any other composition as regards Adhesiveness, Effectiveness, and Durability, to prevent the radiation of heat, save fuel, increase the power of steam, and keep the Stokehole and Engine Room cool. It will at once show a leak; it cannot catch or communicate fire.

Used for many years by H.M. Government in the Dockyards, Powder Mills, and Small Arms' Factory, the S.S. 'Great Eastern,' the Metropolitan Board of Works, a number of large S.S. Companies, and some of the greatest Engineers. *Can be seen on highly-heated surfaces, where it has been for ten years without the least apparent change.*

This Non-Conducting Composition will be found much superior to Felt, for the following reasons :

1. It adheres to the iron and other metals, and does not admit the heat to escape or the air to penetrate through.
2. It will last a much longer time.
3. It need not be removed to examine the state of the Boiler, as it will show the least leak at once.
4. It cannot catch or communicate fire.
5. It completely preserves the iron from rust.

The price of our Non-Conducting Composition is £6 PER TON delivered in London and in Manchester, casks included in weight, unless returned free, and ONE TON WILL COVER 160 PLANE SUPERFICIAL FEET at least two inches thick. It is applied while Steam is up, so that there need be no interruption to the working of the Engine. It is sent in casks ready for application. We either send printed instructions, or we contract to cover all surfaces at per foot, everything included, and measured outside when work done. Scaffolding to be found by Purchasers, and no deduction made for manholes or flanges. Painting and tarring charged extra.

F. LEROY AND CO.,

12, GRAY STREET, COMMERCIAL ROAD, E.; AND GRIFFITH'S STREET, LOWER
BROUGHTON, MANCHESTER.

Agents for E. Voisin's Patent Flameless Cupola Furnace.

RICHARD MORELAND & SON,

ENGINEERS AND MILLWRIGHTS,

AND MAKERS OF

IRON GIRDER WORK, IRON ROOFS,

FIRE-PROOF FLOORS,

AND GENERALLY OF

CONSTRUCTIONAL WORK IN IRON.

WORKS, AT

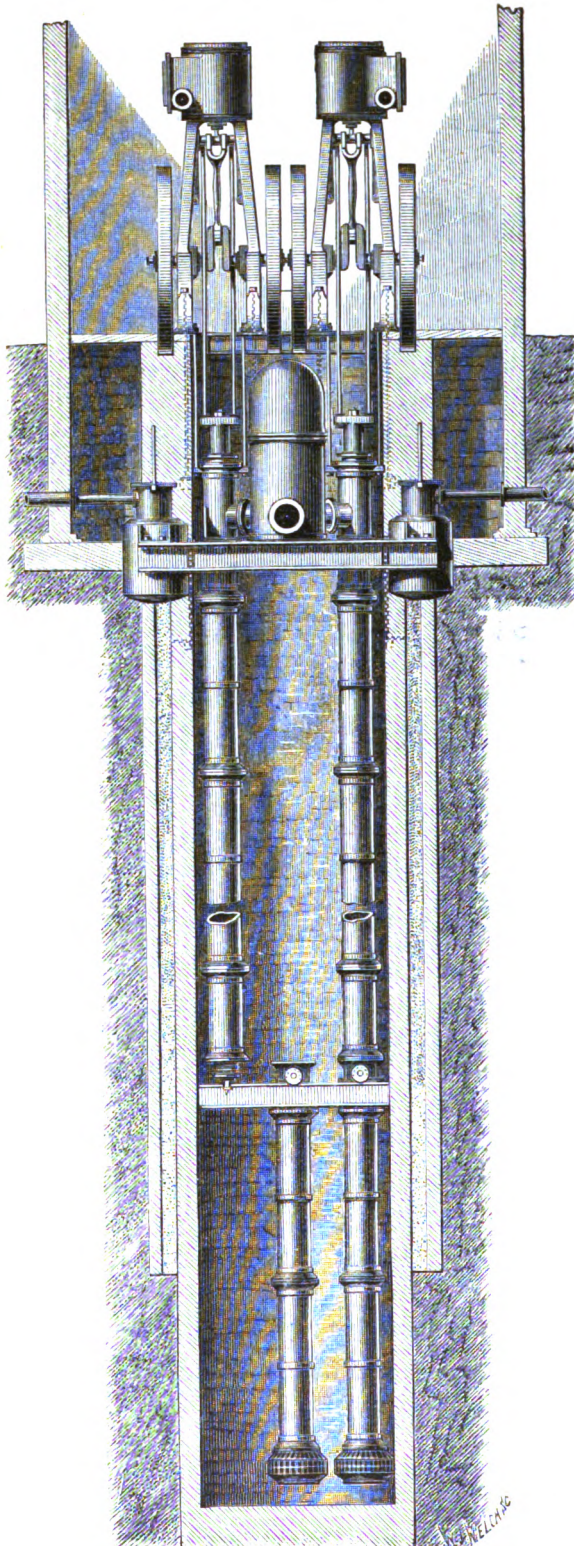
3, OLD STREET, LONDON, E.C.,

*Within ten minutes' walk of the General Post Office, and within three minutes' walk of
Aldersgate Street Station on the Metropolitan Railway.*

MESSRS. R. MORELAND AND SON have carried on for a great many years an old-established business at the above address, and have pleasure in referring to the Illustrations of some of the various Works of their Manufacture, to be found on the following pages.

RICHARD MORELAND AND SON,

ENGINEERS AND MILLWRIGHTS. WORKS: 3, OLD STREET, LONDON, E.C.



PUMPING ENGINES

FOR

WATER-WORKS.

The Illustration shows a compact but efficient type of Engine and Pump Work, where two Condensing and Expansive Engines of 100 Horse-power collectively are placed over a well 10 feet diameter, and require no other foundation nor any support from the walls of the Engine House.

These Engines are most economical for exportation, or where foundations are doubtful or expensive; and embrace at the same time every modern improvement to secure economy in fuel.

The Valve Box and Suction Pipe of one Pump is shown removed by a very simple apparatus, so as to give most convenient access to the Suction Valve, and also to the Pump Bucket, which is readily lowered, as shown, below the Pump Barrel for that purpose.

For Estimates and all Particulars apply to

RICHARD MORELAND AND SON,
ENGINEERS AND MILLWRIGHTS. WORKS: 3, OLD STREET, LONDON, E.C.

ALL KINDS OF MILLWRIGHT WORK.

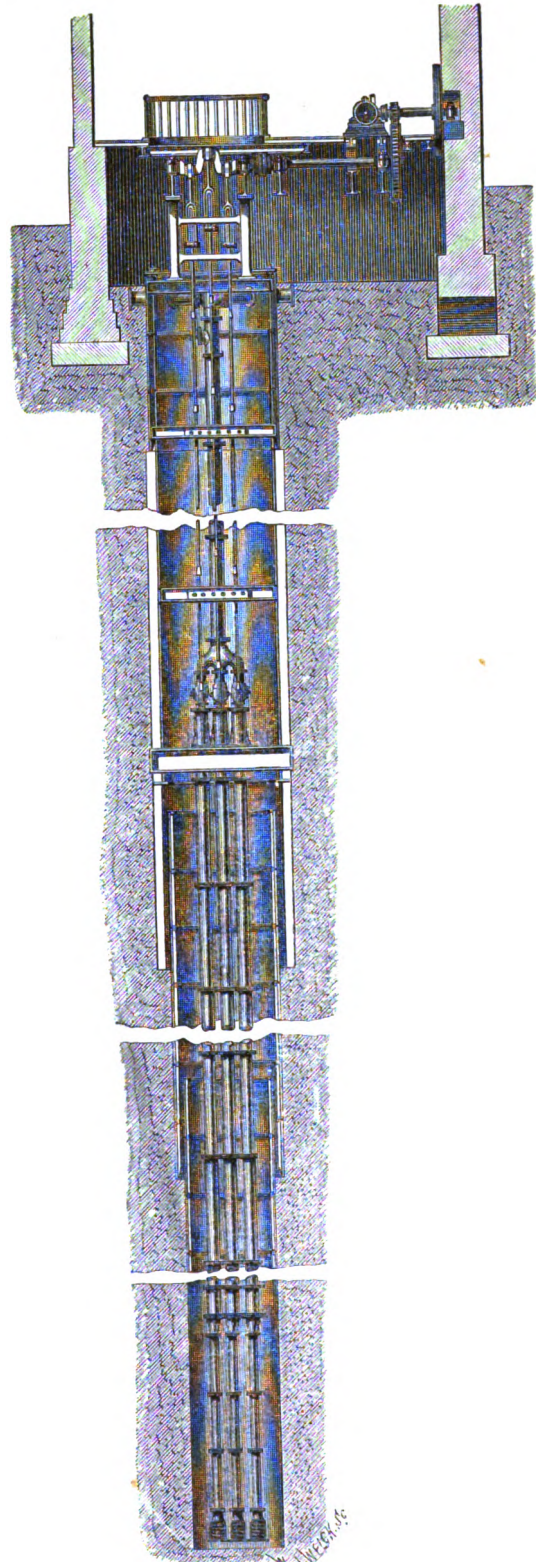
Such work is executed in the most approved and substantial manner for all purposes.

R. MORELAND AND SON have given special attention to Brewery Work of all kinds; and design and supply Brewery Plant for large Breweries on the most improved systems of the best London Breweries.

The Illustration shows a set of Deep-Well Pumps, such as R. MORELAND AND SON have supplied to several of these.

R. MORELAND AND SON have given much attention to the new systems of Cooling Liquor for Breweries, and have supplied some of the most successful apparatus for that purpose now in operation in London, and they are prepared to give Estimates for such, or for the similar apparatus required for the manufacture of Ice on the large scale.

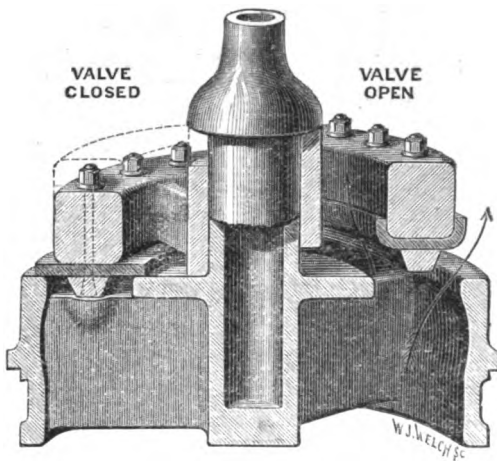
They also make all kinds of Elevators and other Machines for moving or storing malt or grain.



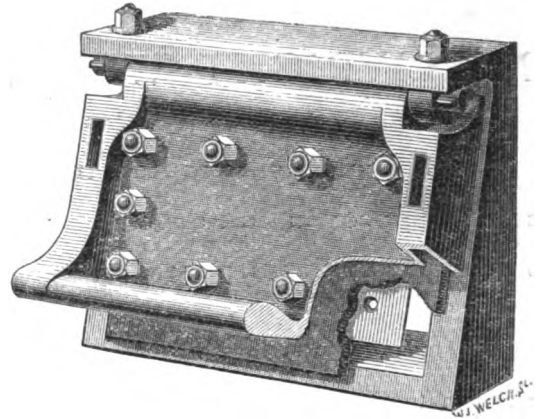
For Estimates and all Particulars apply to

RICHARD MORELAND AND SON,
ENGINEERS AND MILLWRIGHTS. WORKS: 3, OLD STREET, LONDON, E.C.

PUMPING SEWAGE.

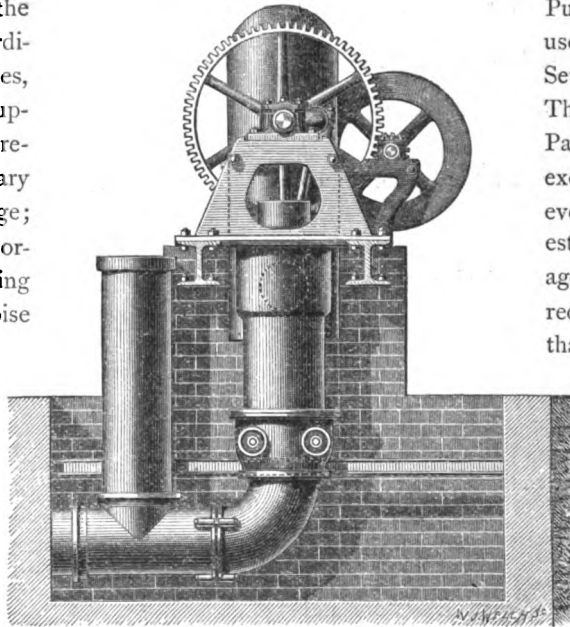


One half of this Section shows the Valve closed, and the other open.



The Illustrations above show two different forms of Thomson and Porter's Patent Pump Valves. These are applicable to any purpose, and are now in use at various Water-Works, under heads of water varying from 20 feet to 400 feet, but they are peculiarly adapted to Pumping Sewage, for which purpose they are the best Valves yet produced as regards durability and efficiency. They give all the advantages of the ordinary indiarubber Valves, without requiring the support of gratings, which preclude the use of the ordinary Valves for pumping sewage; and they surpass the ordinary Valves in working with a minimum of noise or jar.

Both the forms shown above are in extensive use at two of the Metropolitan Sewage Pumping Stations. The Illustration below shows one of the Sewage



Pumps that raise the sewage used at the well-known Sewage Farm at Barking. Thomson and Porter's Patent Valves have been exclusively used there also, ever since the Works were established, nine years ago, and they have hardly required repair during that time. R. MORELAND AND SON supply these Valves, which may be fitted to any Pumps; or, if desired, they grant licences to other Engineers to make and supply them.

For Prices, Terms, and other Particulars, apply to

RICHARD MORELAND AND SON,
ENGINEERS AND MILLWRIGHTS. WORKS: 3, OLD STREET, LONDON, E.C.

HYDRAULIC WORK.

R. MORELAND AND SON DESIGN
AND MANUFACTURE

HYDRAULIC WORK,

SUCH AS

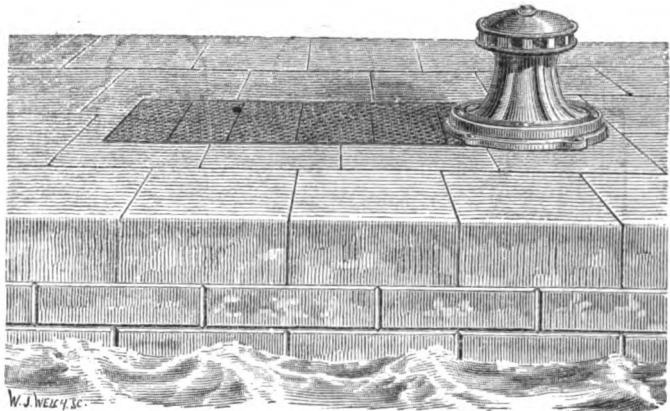
HYDRAULIC CRANES AND LIFTS OF
ALL KINDS,

CAPSTANS, COAL TIPS, AND OTHER
MACHINERY

Worked by Hydraulic Power,

PUMPING ENGINES, PUMPS, AND
ACCUMULATORS,

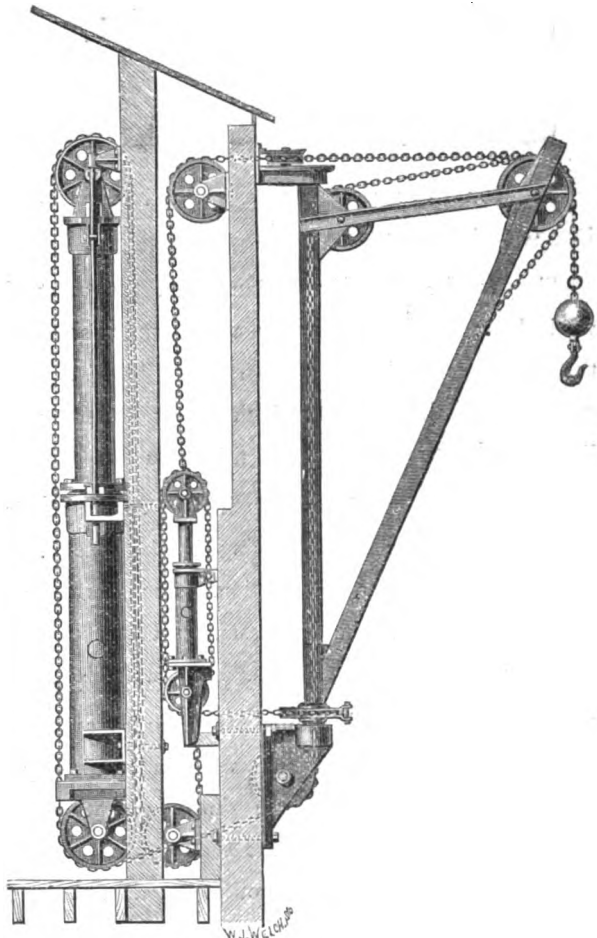
For working Hydraulic Machines.



The Pumping Engines are made either horizontal in the usual way, or vertical, with the type of Engine shown at page 442. An example of the latter plan, with a *Condensing* Engine, has recently been supplied by R. MORELAND AND SON to the Bute Docks, Cardiff. The adoption of this plan saves about half the fuel usually consumed.

The Illustration above shows the Hydraulic Capstans made by R. MORELAND AND SON, for the Extension Works, Chatham Dockyard. The other Illustration shows a Hydraulic Crane (on Boetius' Patent System), well adapted to situations where the loads are variable. It has double chains, and can be worked at pleasure with *one* in the usual way, or with two. In the former case it lifts only half the full load; but the lifting ram moves over half its stroke only, and so saves half the water and power that would otherwise be used.

This kind of Crane may be seen in operation, with others of R. MORELAND AND SON's Hydraulic Machines, at one of the largest Factories in London.

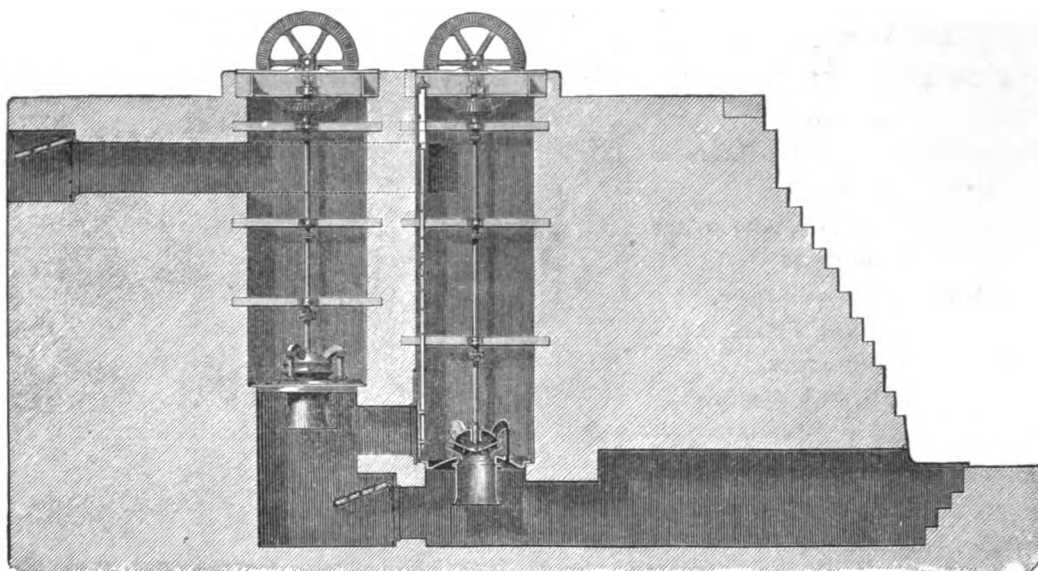


For Estimates and all Particulars apply to

RICHARD MORELAND AND SON,

ENGINEERS AND MILLWRIGHTS. WORKS : 3, OLD STREET, LONDON, E.C.

CENTRIFUGAL PUMPS.



R. MORELAND AND SON Design and Manufacture LARGE CENTRIFUGAL PUMPS for GRAVING DOCKS and DRAINAGE WORKS.

They make Centrifugal Pumps on the most simple system, with the Axis of the Wheel vertical, and taking the water at the under side only; and with a special contrivance by which the water itself balances the whole weight of the moving parts. By this means the friction, and consequently the power and the wear and tear, are reduced to a minimum. The larger the Pumps, the more important is this feature in their construction.

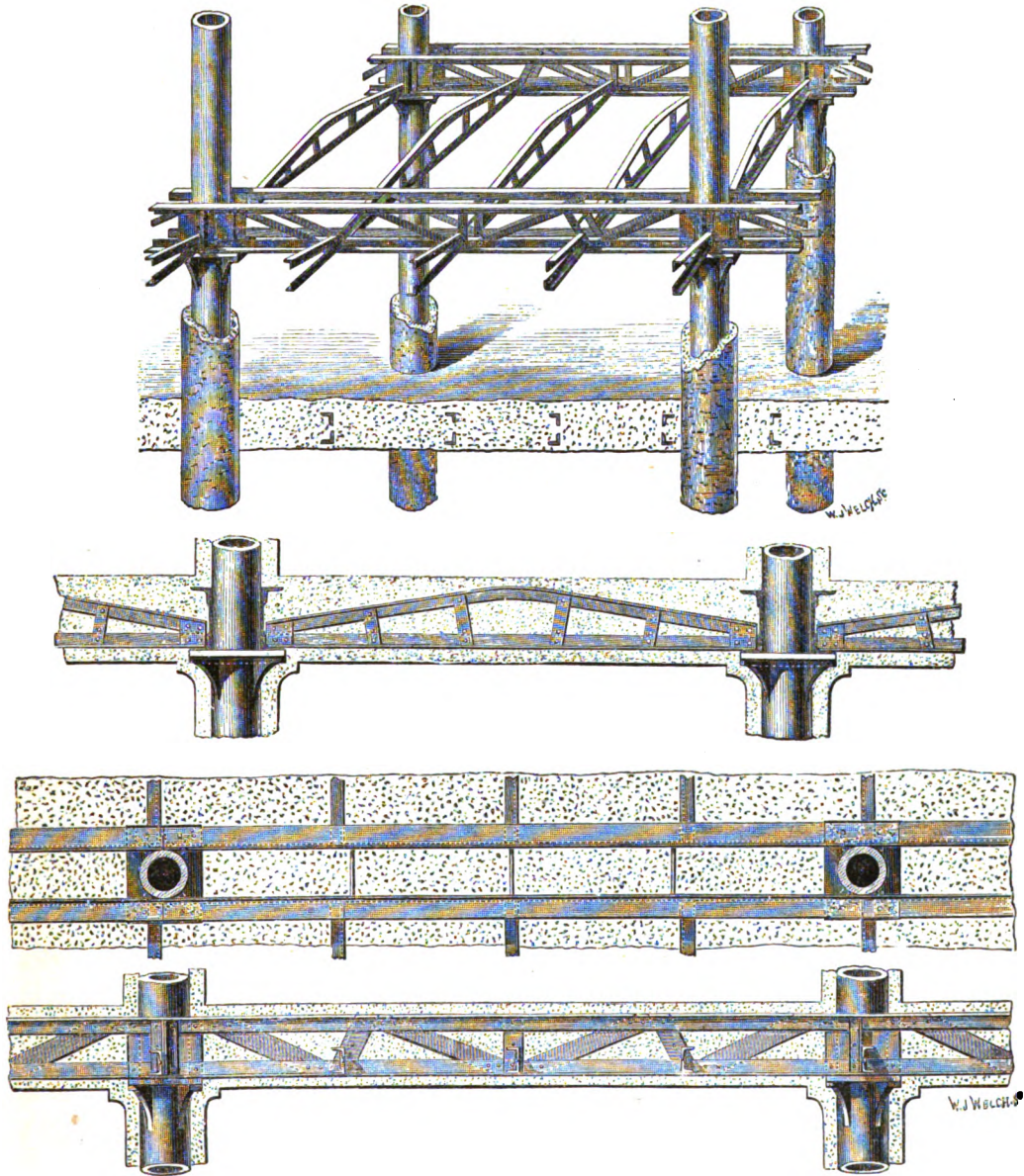
The Illustration shows a pair of Centrifugal Pumps constructed on this plan, and recently set to work at the New Graving Dock, Bute Docks, Cardiff. One of the Pumps is shown in section and the other in elevation. Such Pumps can either be worked by direct-acting Engines, or with Gearing, as the circumstances of the case may render advisable.

In the case of Cardiff the maximum lift required is sometimes great, amounting to from 30 to 40 feet, and the Pumps are so arranged that while the Graving Dock is partly filled and the lift is moderate, both Pumps act independently, as shown in the Illustration. But when the lift becomes too great, by the simple operation of opening the sluice between the Pumps the lower Pump discharges into the suction chamber of the higher Pump, the stop-back Valve, shown below the sluice, closes of its own accord, and the lift is divided between the Pumps.

For Estimates and all Particulars, apply to

RICHARD MORELAND AND SON,
ENGINEERS AND MILLWRIGHTS. WORKS: 3, OLD STREET, LONDON, E.C.

FIRE-PROOF FLOORS.

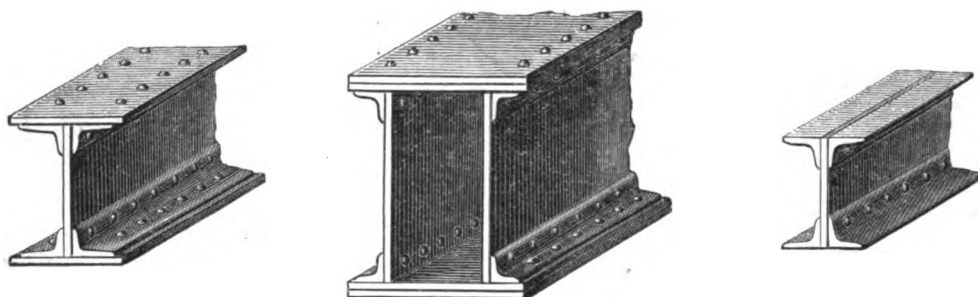


R. MORELAND AND SON have given much attention to the construction of Fire-proof Buildings, and the Illustrations show one of their most improved methods of construction, in which the Girders carrying the floor are open in their structure, and the floor itself is therefore a *continuous* mass of concrete, and the columns themselves can be cased in the same concrete.

For Estimates and all Particulars apply to

RICHARD MORELAND AND SON,
ENGINEERS AND MILLWRIGHTS. WORKS : 3, OLD STREET, LONDON, E.C.

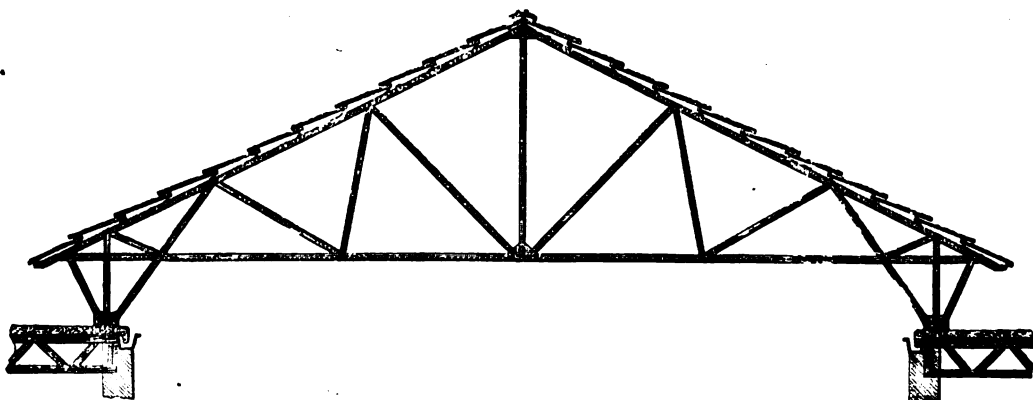
WROUGHT-IRON GIRDERS, ROOFS, AND CONSTRUCTIONAL WORK.



R. MORELAND AND SON design and manufacture all kinds of Wrought-Iron Girder Work, Columns, Stanchions, Roofs, Fire-proof Doors, and Constructional Ironwork generally. They have supplied the Ironwork for some of the most important Buildings of recent erection in London, such as the Midland Grand Hotel, St. Pancras; Royal Hotel, Blackfriars; Messrs. Waterlow's new Factories in Finsbury, &c., &c. The Roof shown in the Illustration below is one over the court-yard at the latter building. It is entirely covered with glass, with large openings all round for ventilation.

R. MORELAND AND SON keep a large stock of Iron suitable for Girders, and when such are wanted in haste, they can generally supply them at a few days' notice.

They undertake to supply or estimate for Girders, Columns, and Builders' Ironwork generally of the best and cheapest construction, on being informed as to the weight to be carried, and any other data that affect each particular case.



For Estimates and all Information apply to

RICHARD MORELAND AND SON,
ENGINEERS AND MILLWRIGHTS. WORKS: 3, OLD STREET, LONDON, E.C.

BRYAN CORCORAN, WITT, AND CO.

(ESTABLISHED UPWARDS OF A CENTURY),

Successors to and purchasers of the old-established business of BRYAN CORCORAN AND CO., of Mark Lane, London,

BUILDERS OF FRENCH MILLSTONES, CORN, FLOUR, RICE, AND PAPER-MILL ENGINEERS,

WIRE WEAVERS AND WORKERS, MILLWRIGHTS, AND GENERAL MILL FURNISHERS.



*Prize Medal and Two Honourable Mentions,
Paris, 1855; Honourable Mention, Vienna,
1873; Grand Gold Medal, Moscow, 1872.*



CONTRACTORS TO
H.M. GOVERNMENT.

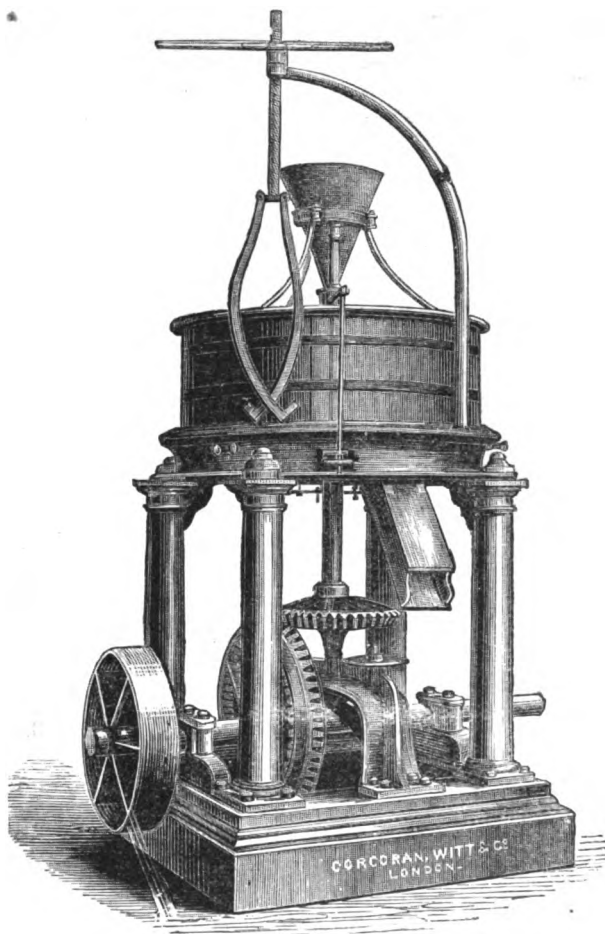


*The only Medal awarded in 1851 for Fine
Woven Wire; also Honourable Mention,
Vienna, 1873, London International, 1873-74.*

IMPROVED PORTABLE CORN-MILLS.

These Mills are in great request both in the home and foreign markets, and any number, up to six pairs of stones, may be fitted in one frame and driven from one lay shaft. They can be readily fixed without the aid of skilled labour, they are self-contained, and require no other foundation than a

**MANUFACTURERS OF
MACHINERY
FOR CRUSHING AND
GRINDING, IMPROVED
MACHINERY FOR
HUSKING AND CLEANING
RICE, OIL MILLS, FIXED
AND PORTABLE STEAM-
ENGINES,
WATER WHEEL AND
TURBINES, SILK FLOUR-
DRESSING MACHINES,
SMUTTERS, SEPARATORS,
ELEVATORS, CREEPERS,
SACK HOISTS,
BLASTS, AND EXHAUST
FANS.**



timber balk to which they are bolted. The Flour Machine may be driven from a pulley on the lay shaft. These Mills can be arranged to deliver the Meal into Elevators which carry it direct to the Dressing Machine, the whole forming with the cleaning Machinery a complete Mill.

**MANUFACTURERS OF
FLOUR-DRESSING
MACHINE WIRE, STRONG
ROUND OR SQUARE BAR
SMUT-MACHINE WIRE,
IRON HOPPER WIRES,
JUMPER AND SCREEN
WIRES, STOUT IRON
WIRE FOR MINING PUR-
POSES, KILN WIRE,
IRON, BRASS, AND COP-
PER SIEVE WIRES,
STRONG IRON AND STEEL
WIRE FOR RICE AND
BARLEY MILLS.**

PERFORATED ZINC, IRON, BRASS, COPPER, AND STEEL SHEETS.

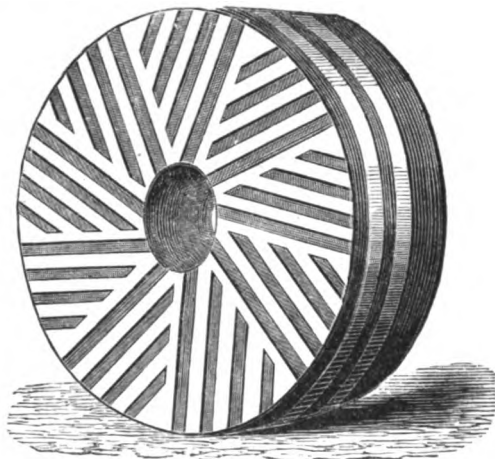
BRYAN CORCORAN, WITT, AND CO.,
MARKET BUILDINGS, 28, MARK LANE, LONDON, E.C.

BRYAN CORCORAN, WITT, AND CO.

(ESTABLISHED UPWARDS OF A CENTURY),

Successors to and purchasers of the old-established business of BRYAN CORCORAN AND CO., of Mark Lane, London,

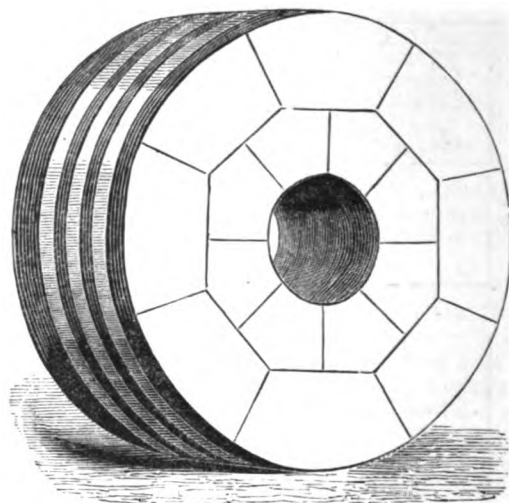
Beg to call the attention of Millers, Millwrights, and others, and invite their inspection of their large stock of personally selected French Burrs and Millstones of the best qualities, for which they are justly celebrated, having supplied the principal Millers, both in London and Country, for many years. They have just erected new and spacious Millstone Sheds, upwards of 200 feet in length, at Cubit Town (close to North Greenwich Station), where generally upwards of 100 pairs of various sizes ready for delivery may be seen.



BUILDERS OF FRENCH MILLSTONES,
Of Best Selected Free-Cutting Brown Nutmeg Burr.

With B. C., W., and Co.'s Improved Dress of 9 quarters, 4 furrows, and $3\frac{1}{2}$ drift.

N.B.—We select these Burrs personally, and can confidently recommend the quality as being the very best ever produced for Grinding all sorts of English and Foreign Wheat, Barley, Indian Corn, &c.



BUILDERS OF FRENCH MILLSTONES,
For Grinding Roman and Portland Cements, Coprolites, Artificial Manures, &c. These Millstones are built edge and end ways, of specially-selected Burrs of a very hard and tough nature, as supplied by us to all the principal Grinders in the United Kingdom.

N.B.—We guarantee all our best Stones to have a perfect joint from face to back.

FINE GRIT WHITE PEAK STONES,

Specially selected for Rice Shelling and Barley Mills.

DERBYSHIRE GREY PEAK STONES,

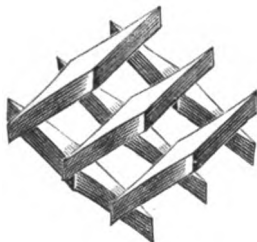
Of best quality, for Grinding Barley, Oats, Peas, Beans, &c.

COLOGNE STONES,

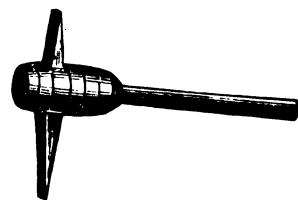
Of finest Quality, for Paints, Colours, White Lead, Peas, Printers' Ink, &c., &c.

HARD PEAK RUNNERS,

For Oil Mills, &c.



MILL BILLS,
Of the finest Cast Steel.



BILL THRIFTS.

CORNISH AND SCOTCH GRANITE EDGE RUNNERS,
NEWCASTLE AND OTHER GRINDSTONES OF SUPERIOR QUALITY.

MAHOGANY STONE STAFFS, CAST-IRON STONE PROOFS, &c.

MILLSTONE MAKERS, WIRE WEAVERS, BRUSH MAKERS, &c.

Manufacturers of all kinds of Flour-Mill Machinery, and every article required by Corn and Rice Millers, Cement and Coprolite Grinders, Millsters, Paper Makers, &c. Dealers in Paper, and General Merchants.

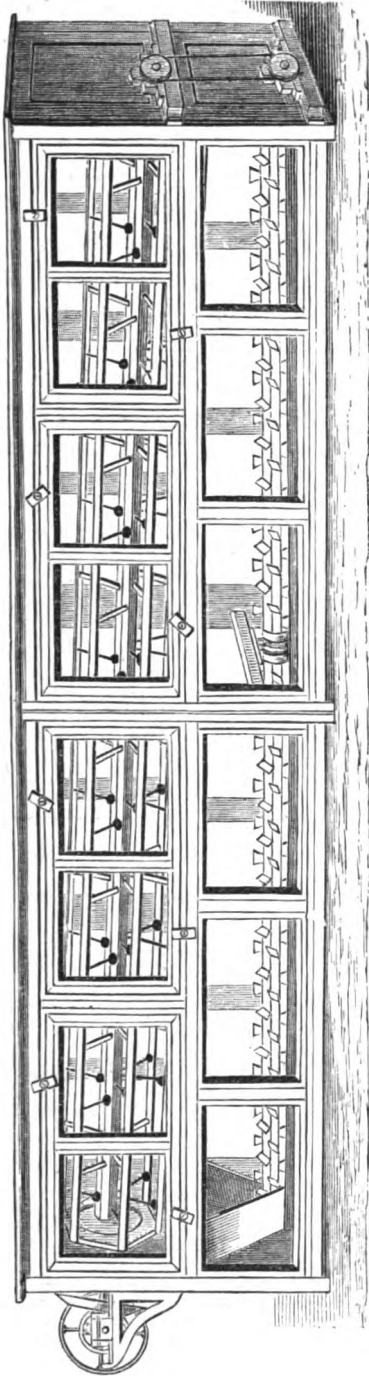
BRYAN CORCORAN, WITT, AND CO.,

MARKET BUILDINGS, 28, MARK LANE, LONDON, E.C.

BRYAN CORCORAN, WITT, AND CO.

(ESTABLISHED UPWARDS OF A CENTURY),

Successors to and purchasers of the old-established business of BRYAN CORCORAN AND CO., of Mark Lane, London.



B. C., W., AND CO. ARE CELEBRATED AS MANUFACTURERS OF THE BEST

SILK FLOUR-DRESSING MACHINES,

WITH ALL THE LATEST IMPROVEMENTS FOR DRESSING FLOUR DIRECT FROM THE MILLSTONES.

These Machines have a built Wooden Shaft, Tap Balls, Wire Hat to break the fall of the Meal at the head of the Silk, and broken Wood Worm to cool the Flour.

N.B.—The above Engraving represents one of our Standard size Machines, Reel 24 feet long by 3 feet 6 inches diameter, of which a large number are now at work in England, Ireland, Scotland, and the Colonies.

Sole Agents in London for the celebrated Anchor Brand "Swiss" Silk. As a great deal of Silk is sold as Swiss which is not made in Switzerland, and is very inferior in quality as compared with the real Swiss, we stamp the annexed brand (which is the Trade Mark of the Maker) upon every sheet of Swiss Silk sold by us.

CAUTION TO MILLERS.—Whereas for more than forty years our Firm have been the SOLE AGENTS IN LONDON for, and keep a large stock of, the celebrated ANCHOR BRAND "SWISS" SILK, the superiority of which over all other Silks, whether French or Dutch make, is so universally known, and has gained it so great a reputation amongst our friends and customers, not only in England but in all parts of the world, we particularly beg to caution our friends and the public against being deceived by the similarity of the Trade Mark of the Dutch made Silk, which has RECENTLY been introduced into London, the numbers of which do not correspond with the number of the Swiss Silk, and the quality is not equal to ours.



Manufacturers of Swiss Bolting Cloths to any dimensions. We supply all numbers of Silk from No. 0000 to No. 16, equalling from 16 to 160 threads to the inch, in any lengths 39 inches wide. Also, on being furnished with dimensions and numbers, we make up complete coverings to fit any sized reel, which only then need lacing on the reel to be ready for work.

BRYAN CORCORAN, WITT, AND CO.,
MARKET BUILDINGS, 28, MARK LANE, LONDON, E.C.

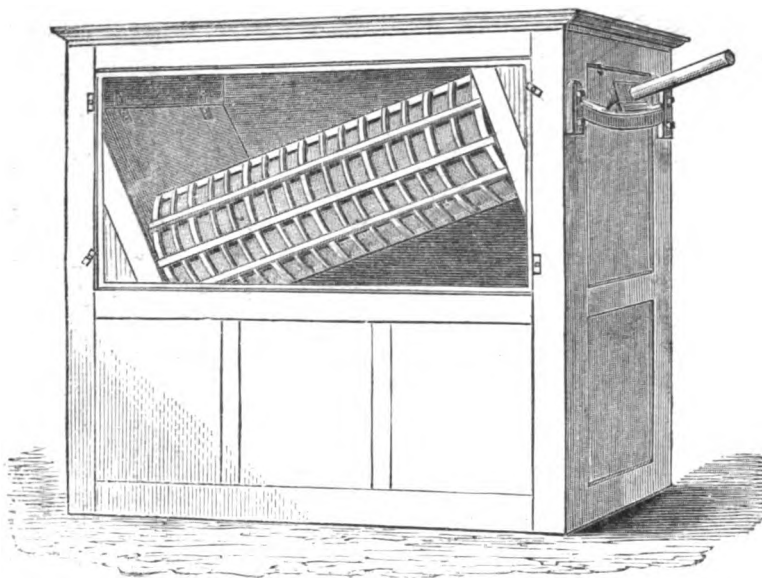
BRYAN CORCORAN, WITT, AND CO.

(ESTABLISHED UPWARDS OF A CENTURY),

Successors to and purchasers of the old-established business of BRYAN CORCORAN AND CO., of Mark Lane, London,

MANUFACTURERS OF

FLOUR-DRESSING MACHINE,



With all the latest improvements,

CLOSE-RIBBED MAHOGANY CYLINDER, BORED AND TURNED, WITH SHAFT, AND BRUSHES HUNG ON IRON ARMS, IN STRONG WOODEN CASE COMPLETE, MADE TO ANY DIMENSIONS.

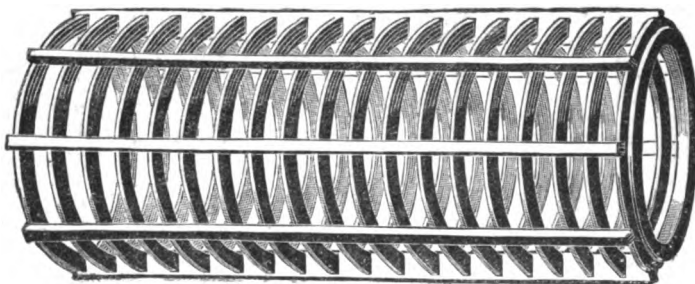
BEST SINGLE AND DOUBLE HAIR FLOUR-MACHINE BRUSHES,

Warranted of the best Russian Bristle.

MAKERS OF

IMPROVED BOLTING MACHINES,

FITTED WITH W. BLACKMORE AND CO.'S PATENT BOLTING CLOTHS.



CLOSE-RIBBED
MAHOGANY FLOUR-CYLINDERS,
MADE OF BEST DESICCATED MAHOGANY, BORED AND TURNED PERFECTLY TRUE.

WEAVERS OF BEST QUALITY MACHINE WIRE, ALL NOS., 10 TO 100 KEPT IN STOCK.
DRESSING AND CLEANING MACHINES OF EVERY DESCRIPTION.

BRYAN CORCORAN, WITT, AND CO.,
MARKET BUILDINGS, 28, MARK LANE, LONDON, E.C.

BRYAN CORCORAN, WITT, AND CO.

(ESTABLISHED UPWARDS OF A CENTURY),

Successors to and purchasers of the old-established business of BRYAN CORCORAN AND CO., of Mark Lane, London,

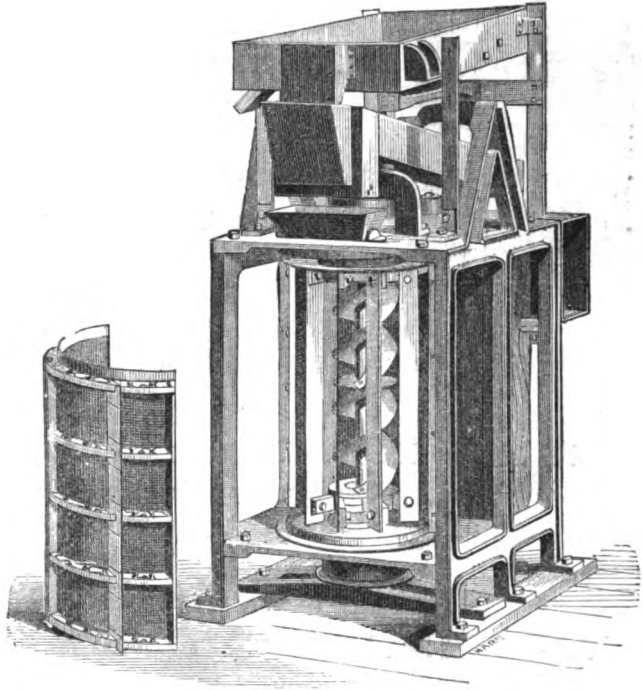
Beg to call the attention of Millers and others to their new and complete

SMUT MACHINE, "THE CHALLENGER,"

WITH DOUBLE ASPIRATOR AND SEPARATOR COMBINED.

In offering the above Machine in the market we do it to meet the want of Millers who have not sufficient space for a large Machine, and require one of a less expensive construction. We can recommend it to anyone requiring an article of this description, and can confidently state that it is the cheapest and most complete Machine yet invented, as it embraces all the essential parts of the more costly Machine. For simplicity and durability it is unequalled; all the working parts are accessible when at work. "The Challenger" is rightly named, as anyone in want of a Machine may have it on approval to test its merits, and if not approved of can be returned, carriage paid. It is also perfectly Fire Proof, as it is entirely constructed of iron.

In the construction of this Machine will be observed the screw in the centre behind the beaters, the action of which prevents the grain passing down too quickly. It also compels every portion of the grain to pass entirely through the scouring surface of the cylinder and external part of the beaters. Secondly, the dust is carried away through the wire on one side of the cylinder, by a powerful current of air drawn through the top and bottom centres by the action of the screw and beaters, conveying it to any convenient place in the mill, thereby saving the great annoyance of having it done by hand labour.



IRON SMUT-MACHINE,

FOR SMALL MILLS.

This Machine is very effective. The wheat is subjected to a process of severe friction. First, by passing over a corrugated metal plate; next, between two cylinders of rough wire, with beaters, and then through a powerful fan blast from the wind fan below attached. It occupies but little space; is complete in itself. The small Machine will clean from 5 to 6 qrs. per hour when driven at the rate of 650 revolutions per minute. It is also made with a Sifter or Separator, driven by a small strap or pulley from the spindle.

The cylinders of both these Machines are clothed with steel wire, and secured with nuts to each half; and are also self-sharpening, inasmuch as while one sharp edge is gradually worn smooth, the other is brought up to a fine cut, and by reversing the cylinder, it is equal to new.



Single and Double Hair and Split-Cane Brushes for Barrel Smut-Machines, &c.

Weavers of Iron and Steel Smut-Wire, Round and Square Bar. Dressing Machines of every description.

BRYAN CORCORAN, WITT, AND CO.,

MARKET BUILDINGS, 28, MARK LANE, LONDON, E.C.

BRYAN CORCORAN, WITT, AND CO.

(ESTABLISHED UPWARDS OF A CENTURY),

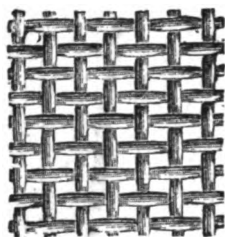
Successors to and purchasers of the old-established business of BRYAN CORCORAN AND CO., of Mark Lane, London,

WIRE WEAVERS AND WORKERS.

PRIZE MEDALS AND HONOURABLE MENTIONS,

PARIS, 1855; LONDON, 1851; LONDON INTERNATIONAL, 1873-74; FOR FINE WIRE CLOTH.

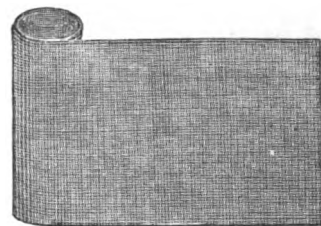
ESTABLISHED UPWARDS OF A CENTURY.



WEAVERS OF FLOUR-DRESSING
MACHINE WIRE.

STRONG ROUND OR SQUARE BAR
SMUT-MACHINE WIRE.

IRON HOPPER WIRES, JUMPER AND SCREEN
WIRES.



STOUT IRON WIRE FOR MINING PURPOSES,
IRON, BRASS, AND COPPER SIEVE WIRES.

STRONG IRON AND STEEL WIRE FOR RICE AND BARLEY MILLS.

THE ORIGINAL MAKERS OF

PAPER-MACHINE WIRES,

Commenced by us in 1805, and now woven to any width.

STRONG BRASS AND COPPER BACKING AND WASHING WIRES.
LATTICE, RAG, AND WINDOW WIRES.

MAKERS OF THE IMPROVED PAPER-MACHINE WIRES WITH SILK EDGES.

WOVE AND LAID DANDY ROLLS.

MOULDS FOR HAND-MADE PAPERS, with water marks of any device to order.

WET AND DRY FELTS, COUCH ROLLS, JACKETS, &c., &c.

AGENTS FOR

PERREAUX'S PATENT PUMPS

(Made expressly for Paper Makers),

Fitted with glass barrels mounted in cast-iron suction and rising main, wrought-iron stretcher rods,
and fitted with patent india rubber valves, mounted in brass.

FOR PUMPING PAPER PULPS, HALF STUFF, BLEACHES, CHEMICALS, ACIDS, DYES, AND CORROSIVE
LIQUIDS.

PATENT AND INDIA RUBBER DECKLE STRAPS.

INDIA RUBBER, LEATHER, GUT, GUTTA-PERCHA, AND OTHER DRIVING BANDS.

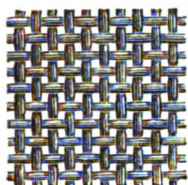
IMPROVED GALVANIZED WIRE NETTING,

For aviaries, cages, pheasantries, rabbits, hares, dogs, poultry, and for window guards, and training
plants.

NEEDLE LUBRICATORS, BELT FASTENERS, ENGINE OIL, ETC.

BRYAN CORCORAN, WITT, AND CO.,
MARKET BUILDINGS, 28, MARK LANE, LONDON, E.C.

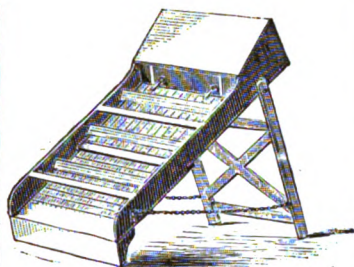
To Maltsters, Brewers, Corn Merchants, and others.



6912 and 9074
Holes per Sq. Foot.

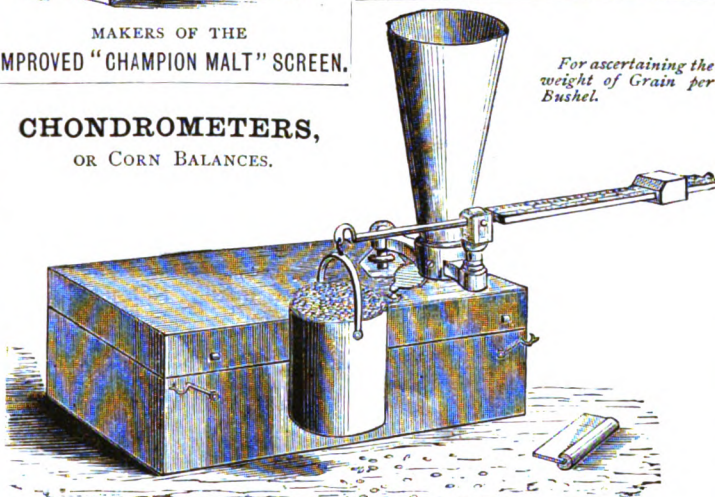
Makers of Woven Iron-Wire Malt Kiln Floors, the best and cheapest Floors for Malt Kilns; they offer the least possible resistance to the current of heated air passing through, and when properly laid, last for thirty or forty years. Used by the principal maltsters in the United Kingdom, the Continent, and the Colonies. Prices of Wire Floors, Ironwork, Iron, Wood, or Copper Cows, &c., on application.

The saving of fuel in Kilns constructed on our plan is very great. (See Testimonials, next page.)



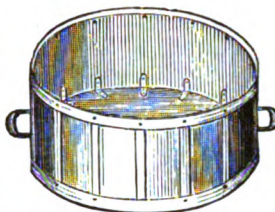
MAKERS OF THE
IMPROVED "CHAMPION MALT" SCREEN.

CHONDROMETERS,
OR CORN BALANCES.



For ascertaining the
weight of Grain per
Bushel.

METERS' STANDARD

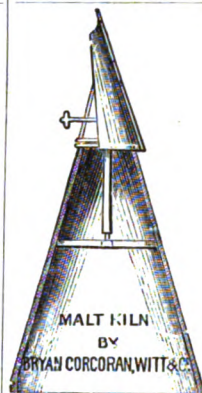


Receivers for Sampling Corn in Bulk.

BUSHEL MEASURES.

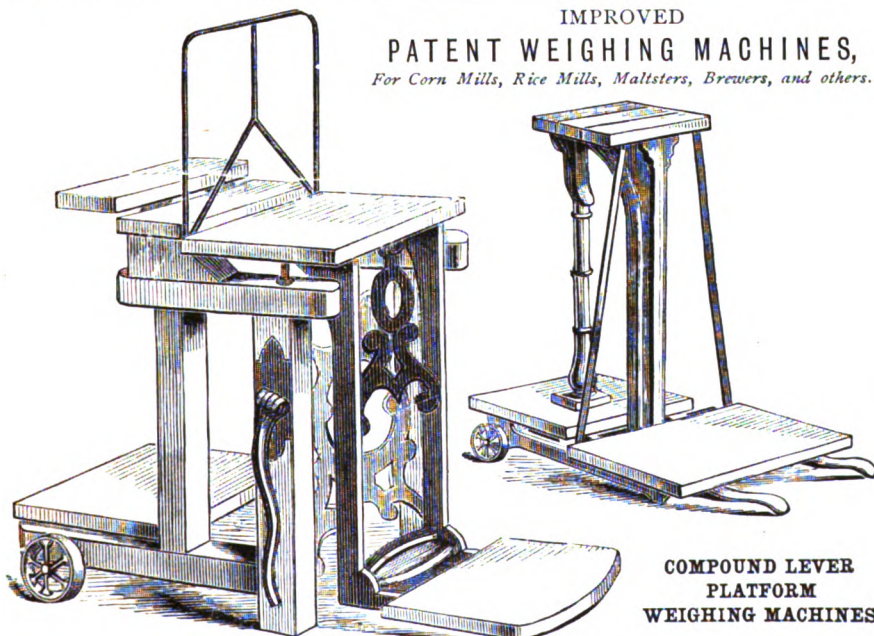


CORN, COAL, & SEED
MEASURES.



MAKERS OF
WOOD, IRON, AND
COPPER COWLS,
For Malt and Hop Kilns,
with all the latest
Improvements.

IMPROVED
PATENT WEIGHING MACHINES,
For Corn Mills, Rice Mills, Maltsters, Brewers, and others.



COMPOUND LEVER
PLATFORM
WEIGHING MACHINES.

PATENT SPRING DIAL WEIGHING MACHINES,

With Silvered Dial and Glass Protector, in Case complete, to weigh from 1 lb. to 112 lb., and upwards.

WEIGHING MACHINES AND STEELYARDS FOR ALL PURPOSES. IRON AND BRASS WEIGHTS.



SACK AND WAREHOUSE
TRUCKS.

Sack Trucks, with flange wheels, covered with our Patent India Rubber Tyres, will not break the Malt when wheeled over it.



THE PATENT
NEEDLE LUBRICATOR.

BRYAN CORCORAN, WITT, AND CO.,
MARKET BUILDINGS, 28, MARK LANE, LONDON, E.C.

BRYAN CORCORAN, WITT, AND CO.

(LATE BRYAN CORCORAN AND CO.),

CONTRACTORS TO
H.M. GOVERNMENT.



*Prize Medal and Two Honourable Mentions,
Paris, 1855; Honourable Mention, Vienna,
1873; Grand Gold Medal, Moscow, 1872.*



Established upwards of a Century.



*The only Medal awarded in 1851 for Fine
Woven Wire; also Honourable Mention,
Vienna, 1873. London International, 1873-74.*

MARKET BUILDINGS, 28, MARK LANE, LONDON.

We beg to call the attention of Maltsters, Brewers, Distillers, and others, to the great improvements we have recently made in the construction of Malt Kilns, by which we are able to effect a considerable saving in the consumption of fuel, while at the same time Malt of the very best quality is made upon our Kilns, and the highest prices are obtained for it in the London Market. References will be given to gentlemen intending to build new Kilns, and through the kindness of some of our friends, by previous arrangement, our Mr. GEORGE PAWSEY WITT will be happy to show Kilns we have already constructed; we are also able, in most cases, to alter existing Kilns. The superiority of our Woven Wire Floors over the ordinary Malt Kiln Tile is very well known, though in some cases, where common Wire has been used and they have not been properly laid, objections have been made to the use of Wire at all. These Kilns of ours, when laid by us, have lasted over forty years. We have an efficient staff for constructing Kilns, and we will send to any part of the country to fix a floor, and will guarantee its being satisfactorily done.

As showing the saving of fuel by our improved plan, we subjoin the following Testimonials from Mr. BALL, a large and well-known Maltster at Bristol, and from Messrs. JUPP AND SONS.

(COPY.)

G. P. WITT, ESQ., LONDON.

WILDER STREET, BRISTOL,

August 24, 1874.

DEAR SIR,—I am in receipt of your favour, and in reply I beg to say the three Wire Kilns you have laid for us do their work extremely well, and entirely to our satisfaction; your system too, with the fire-places, effects a considerable saving in the quantity of fuel used, for I find that the one 50 qr. house, where I used formerly to use 20 cwt. of Coal to dry off, I can now (since you altered the furnace) do the same amount of work with 13 cwt., thus saving 7 cwt., which, at the present high price of fuel, is a consideration.

Yours faithfully,

(Signed) T. H. BALL,

Pro W. J. B.

MESSRS. BRYAN CORCORAN, WITT, & CO.

THE MALTINGS, BRENTFORD, W.

June 1, 1875.

DEAR SIR,—We have much pleasure in bearing testimony to the good workmanship and superiority of the several Screens and Kiln Plates of your manufacture.

The saving in Coals effected by the alterations you have made in our Kilns is very considerable, and therefore of great importance.

We are also very well satisfied with the Woven Wire Floor laid down for us this year, and we think of having another shortly, when we shall require your services.

We remain, dear Sirs, faithfully yours,

(Signed) JUPP & SONS.

We supply plans and drawings for the construction and alteration of Kilns, and our process is capable of being adapted to all Kilns, whether of Wire, Tiles, or Plates. We also contract for the erection of Kilns and Maltings complete.

Besides being Weavers of Wire and Kiln Builders, we make also the Malt Screens, Cows in wood, iron, or copper, Barley Screens, Bushels, Trucks, Fining Sieves, Weighing Machines, Shovels, and indeed all the articles used in the malting trade. Having supplied many of the principal Maltsters for many years, the quality of our articles is so well known that we think no lengthy description is needed. We particularly call the attention of Maltsters to our "Champion" Malt Screen, which screens the Malt in one screening better than any other, and in much less time.

We give the following Testimonial from one of our friends:

CORCORAN, WITT, & CO.

BECCLES,

2nd October, 1874.

GENTLEMEN,—In reply to your inquiry we have pleasure in testifying to the excellence of the Malt Screens with which you have supplied us, as we consider they are as good as any we have ever used, and we shall feel obliged by your sending Four more like the last as soon as possible.

Yours faithfully,

(Signed) JOHN CRISP & SON.

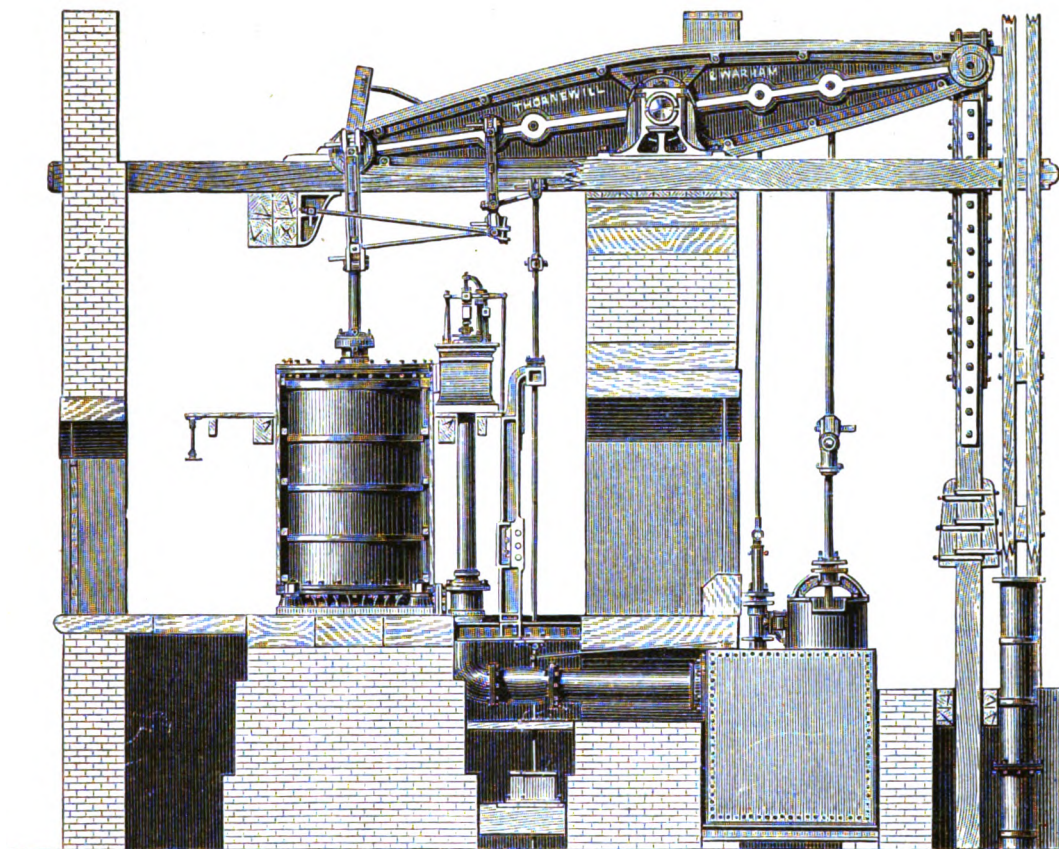
AGENTS FOR THE BEST WELSH COAL FOR MALTSTERS.

PRICES AND TERMS ON APPLICATION.

SHIPPED DIRECT FROM THE COLLIERIES.

BRYAN CORCORAN, WITT, AND CO.,

MARKET BUILDINGS, 28, MARK LANE, LONDON, E.C.



**CORNISH PUMP-
ING ENGINES,**
of all sizes, with Cast
or Wrought Iron
Beams ; with or with-
out Steam-
Jacketed Cylinders.

Also, every
description of Direct-
Acting Pumping
Engines.



SINGLE FLUE BOILER



DOUBLE FLUE BOILER

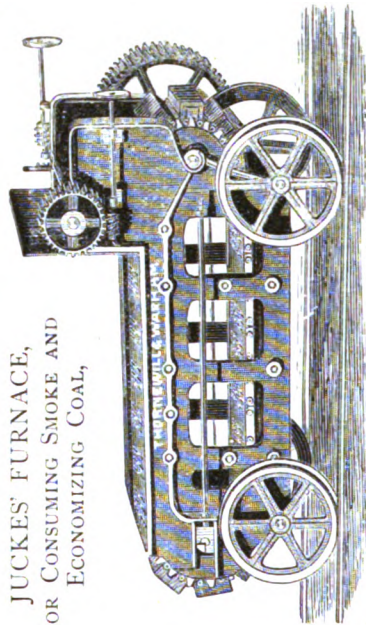
**EGG-ENDED
BOILER,** 5 feet
diameter, and
36 feet long. Best
Staffordshire
Plates, with Low-
moor over fire,
always kept in
stock. Other sizes
made to order.
Also, Cornish and
Lancashire Boilers.

THORNEVILL AND WARHAM,
IRON WORKS, BURTON-ON-TRENT; AND SEVERN ENGINEERING WORKS, DERBY
LONDON OFFICES: 18, GREAT GEORGE STREET, WESTMINSTER.

WORT AND WELL
PUMPS,
OF ALL SIZES.

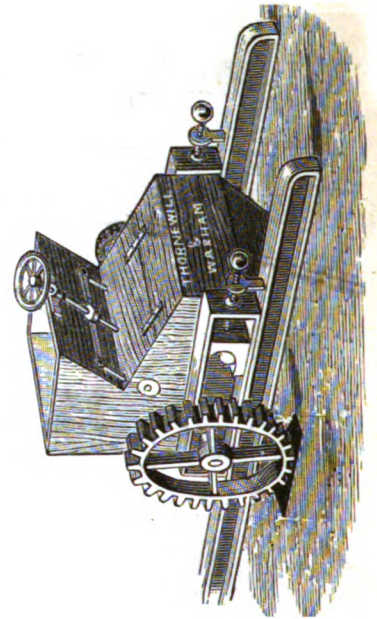


JUCKES' FURNACE,
FOR CONSUMING SMOKE AND
ECONOMIZING COAL,



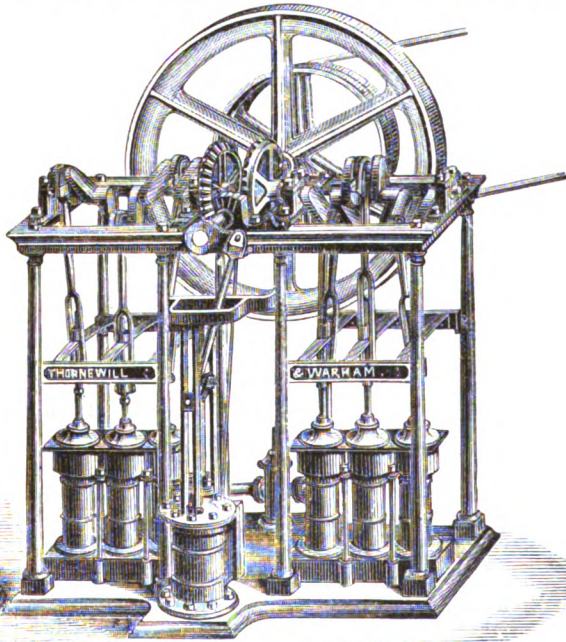
FURNACE

as erected under Messrs. ALISOPP AND SON'S Water and Wort Coppers.

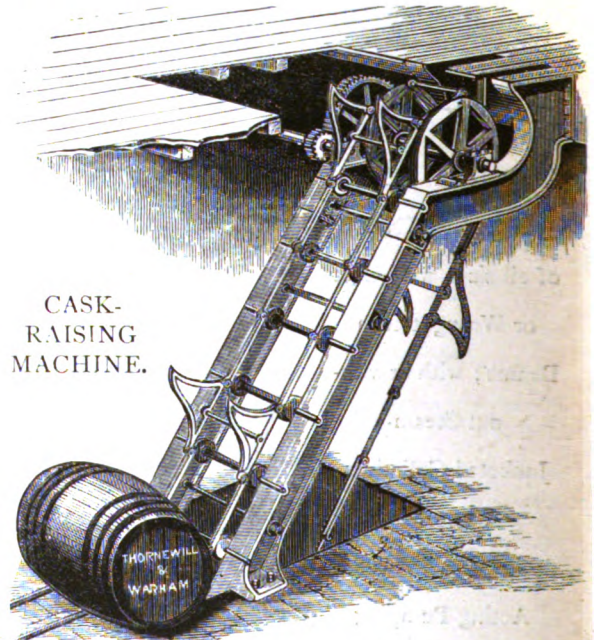


MALT MILL

ENGINE, arranged to drive Wort and Well Pumps.



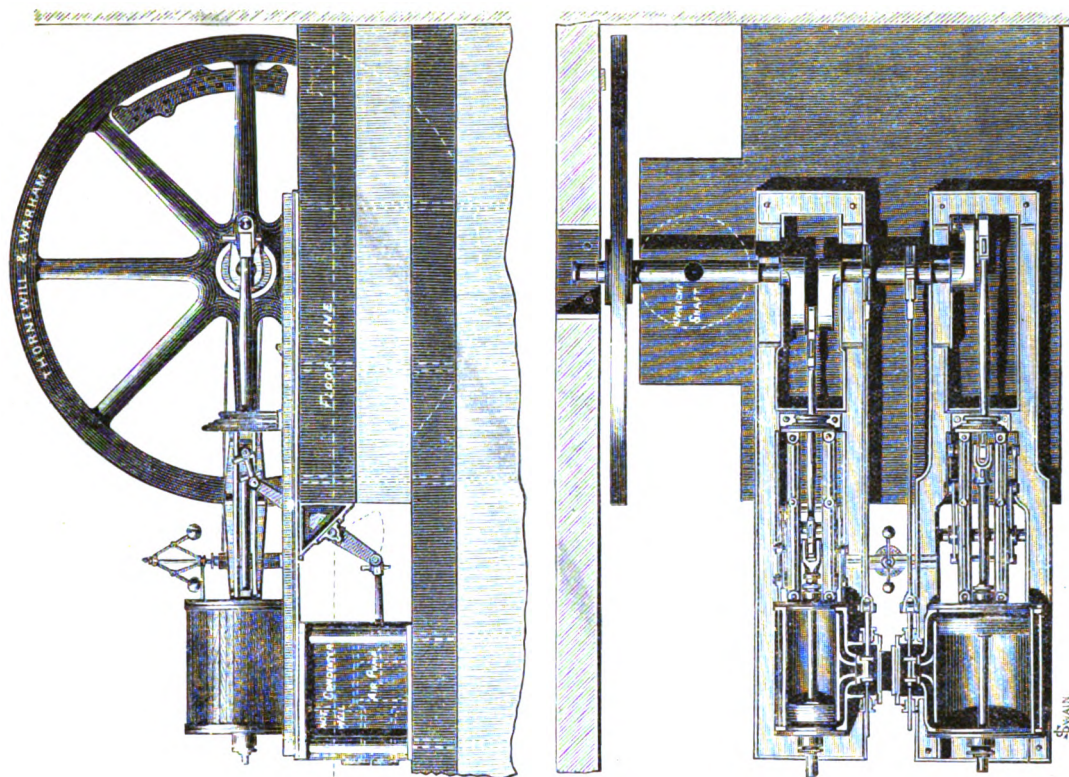
CASK-
RAISING
MACHINE.



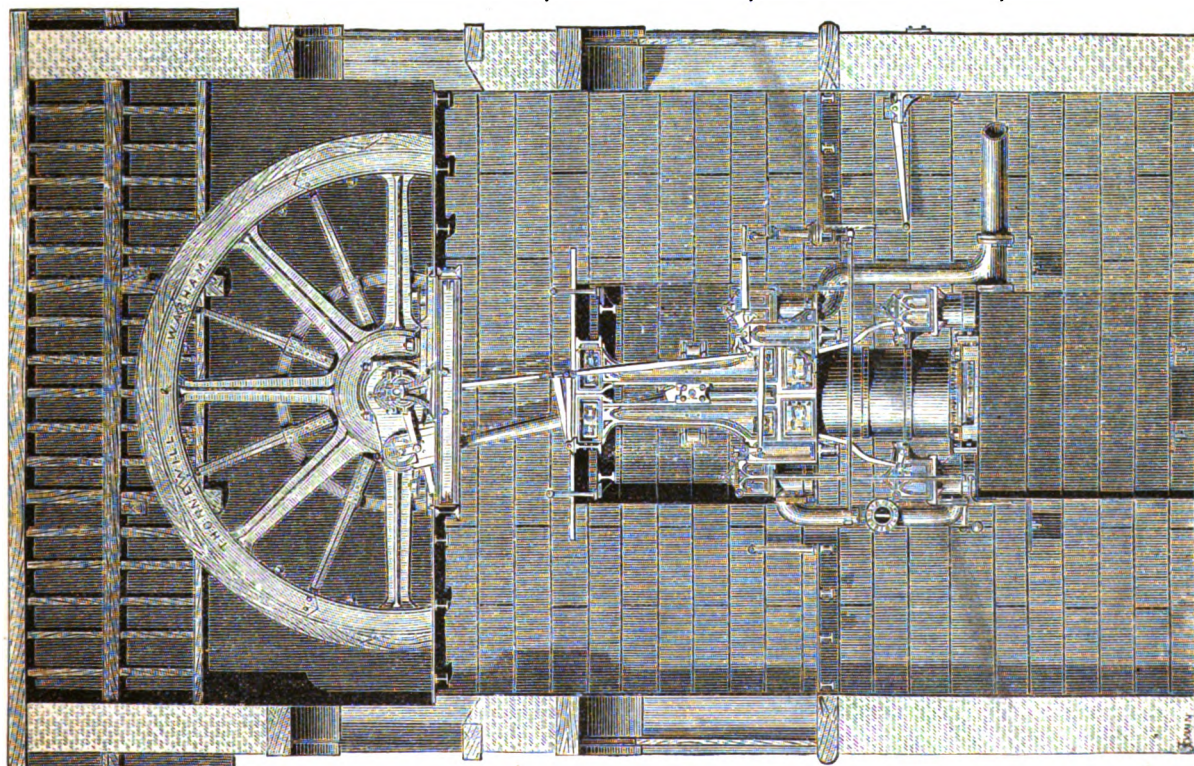
Also Manufacturers of Malt Screws, Mashing Machines, Elevators, Sack Tackle, Shafting and Gearing, and every description of Millwright's Work.

THORNEWILL AND WARHAM,
IRON WORKS, BURTON-ON-TRENT; AND SEVERN ENGINEERING WORKS, DERBY.
LONDON OFFICES: 18, GREAT GEORGE STREET, WESTMINSTER.

COMPOUND ENGINES, FOR MILLS AND FACTORIES.

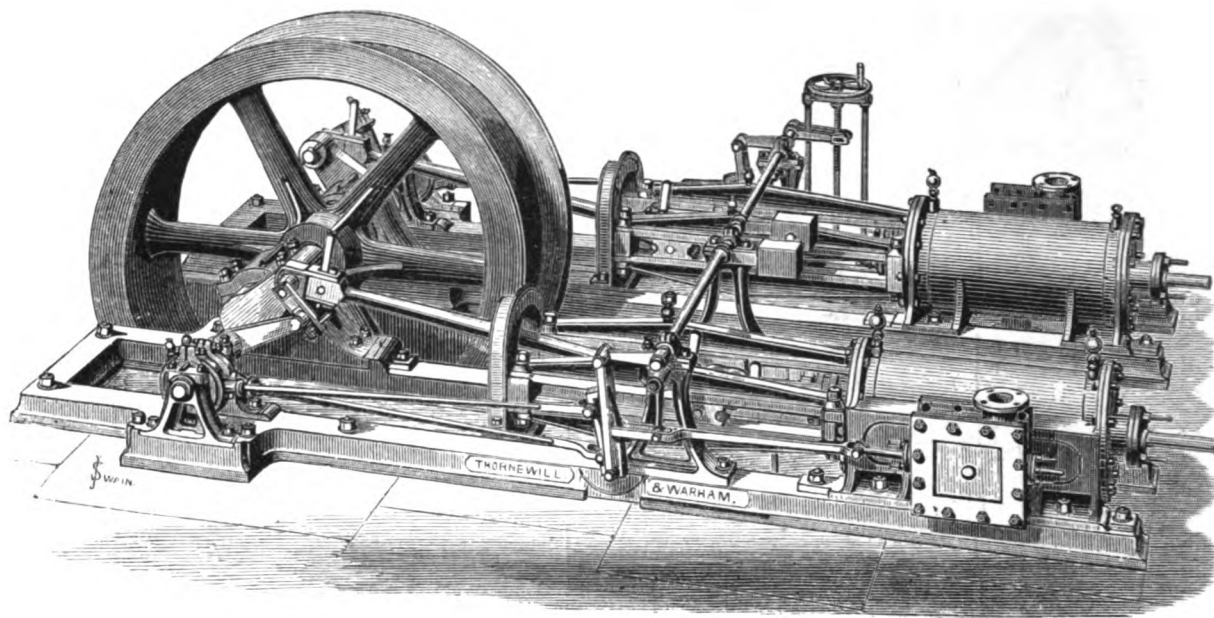


VERTICAL WINDING ENGINE, OF ALL SIZES, FOR COLLIERIES, &c.



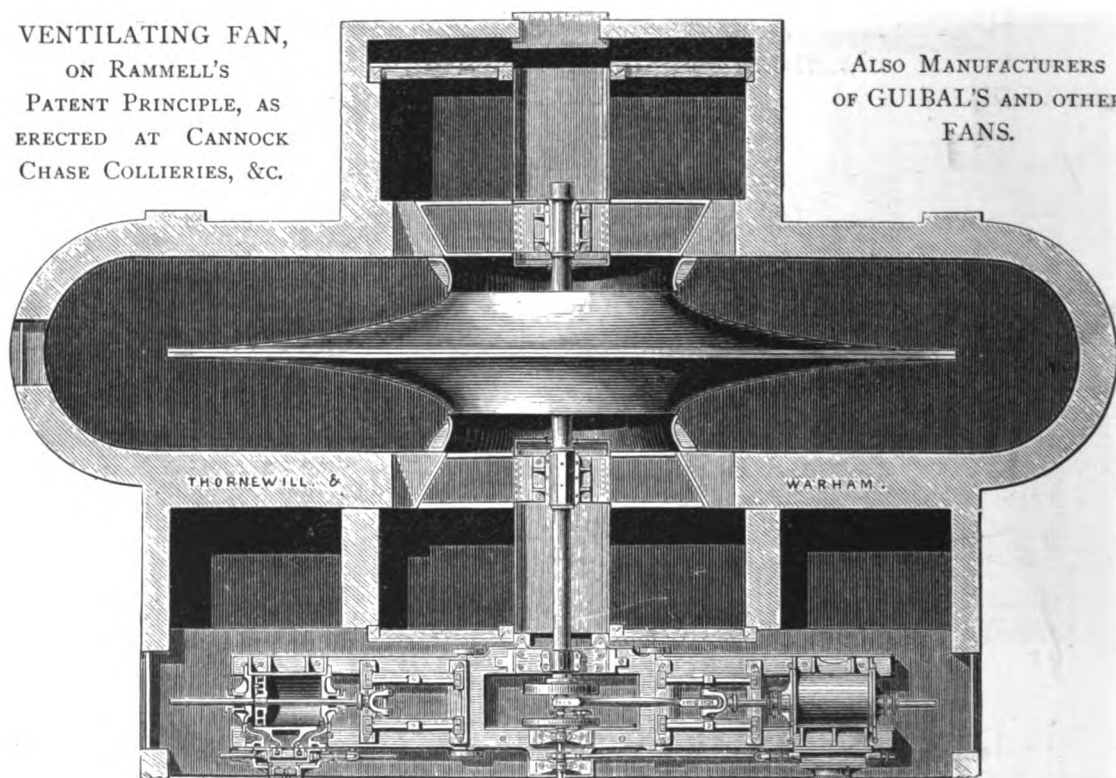
THORNEWILL AND WARHAM,
IRON WORKS, BURTON-ON-TRENT; AND SEVERN ENGINEERING WORKS, DERBY.
LONDON OFFICES: 18, GREAT GEORGE STREET, WESTMINSTER.

HAULING AND WINDING ENGINES OF ALL SIZES TO 40-INCH CYLINDERS,
IN STOCK OR IN PROGRESS.



VENTILATING FAN,
ON RAMMELL'S
PATENT PRINCIPLE, AS
ERECTED AT CANNOCK
CHASE COLLIERIES, &C.

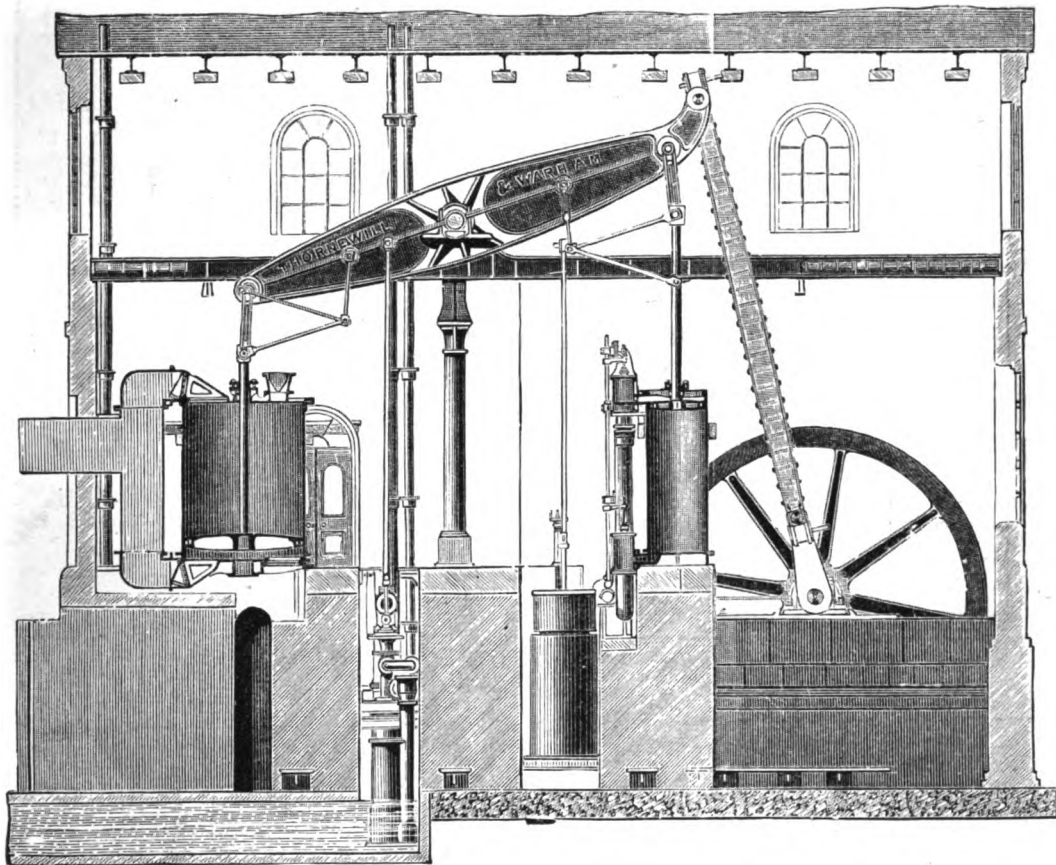
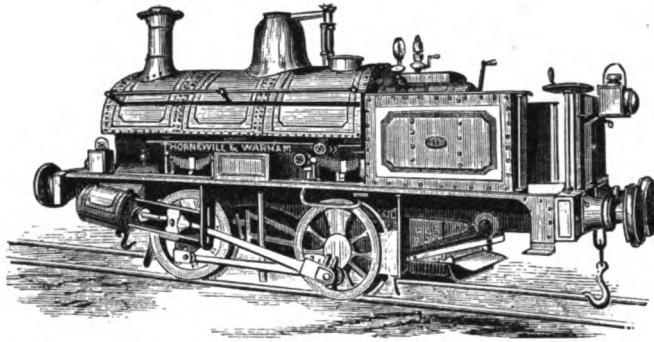
ALSO MANUFACTURERS
OF GUIBAL'S AND OTHER
FANS.



THORNEWILL AND WARHAM,
IRON WORKS, BURTON-ON-TRENT ; AND SEVERN ENGINEERING WORKS, DERBY.
LONDON OFFICES : 18, GREAT GEORGE STREET, WESTMINSTER.

TANK LOCOMOTIVES, for Contractors, Collieries, &c.

Sizes to 14-inch Cylinders, 20-inch Stroke. Always in stock and in progress.

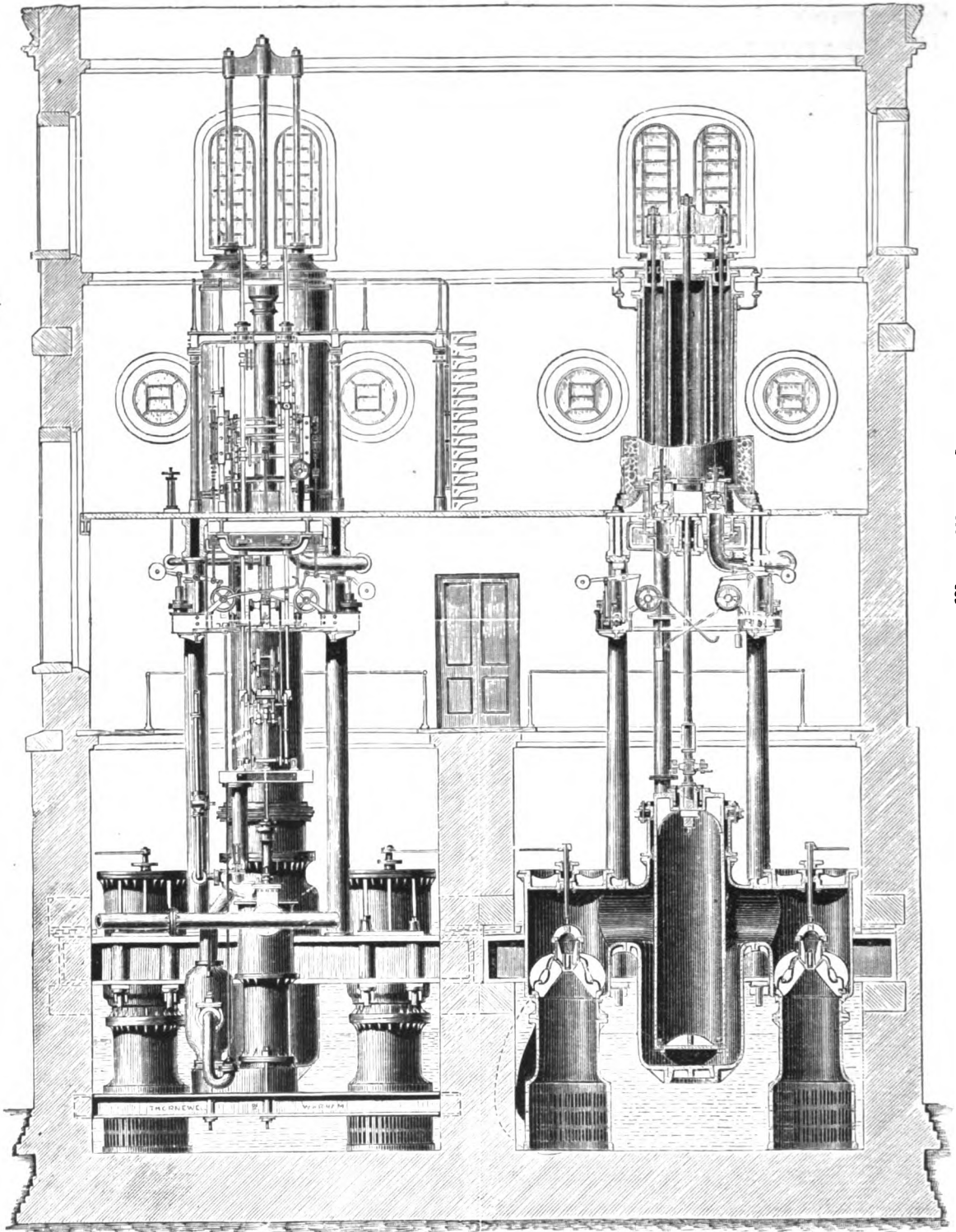


BLOWING ENGINES OF ALL SIZES.

ESTIMATES GIVEN ON APPLICATION.

THORNEWILL AND WARHAM,
IRON WORKS, BURTON-ON-TRENT; AND SEVERN ENGINEERING WORKS, DERBY.
LONDON OFFICES: 18, GREAT GEORGE STREET, WESTMINSTER.

DIRECT-ACTING PUMPING ENGINE, WITH ANNULAR CYLINDER,



AS ERECTED FOR THE EAST LONDON WATER-WORKS COMPANY.

ESTIMATES GIVEN ON APPLICATION.

THORNEWILL AND WARHAM,
 IRON WORKS, BURTON-ON-TRENT; AND SEVERN ENGINEERING WORKS, DERBY.
 LONDON OFFICES: 18, GREAT GEORGE STREET, WESTMINSTER.

MINE MACHINERY, ORE-DRESSING PLANT, ORES, AND METALS.

STEAM MACHINERY.

Pumping Engines, Three-Cylinder Engines for Winding, Driving Capstans, Crushing Mills, Stone Breakers, and other Mine Machinery.

HYDRAULIC MACHINERY.

Three-Cylinder Rotary Engines, Charging and Pumping Engines, Power Transfer Engines and Accumulators.

ORE-DRESSING PLANT.

Rotary Picking Tables, Stone Breakers, Crushing Mills, Kember's Patent Permanent Self-Regulating Jigs, Continuous and Self-Acting Jigs, Clay-Washing Apparatus, Steam Stamps, Californian and Australian Stamps, Continuous Sizing Trommels, Classifiers, Shaking Tables, Buddles, Sand Pumps, &c.

SUNDRIES.

Perforated Plates for Sieve Bottoms, Trommels and Stamp Screens, Magnetic and Electro-Magnetic Separators.

ROCK-BORING MACHINERY.

Rock-Boring Machinery and Appliances of every description.

ORES.

Ores examined and assayed. Machinery designed for the enrichment of ores.

METALS.

Hard Lead, Antimony, and other metals purchased.

PARTICULARS ON APPLICATION.

KEMBER AND CO.,

Machinists, Metallurgists, Assayers, Smelters, and Refiners,

CLARENDON GROVE, DRUMMOND STREET, EUSTON SQUARE, LONDON, N.W.

DRAKE'S
PATENT CONCRETE BUILDING COMPANY
(LIMITED)

UNDERTAKE THE ERECTION OF

EVERY CLASS OF BUILDING IN CONCRETE,

Contracting to execute either the Concrete Works only or the whole of the works of every branch.

DRAKE'S PATENT SYSTEM OF CONCRETE BUILDING

Has been in extensive operation for nearly seven years, and has been applied to Buildings of every kind, including

MANSIONS COSTING FROM £20,000 TO £30,000,

Churches, Institutions, Warehouses, Factories, Engine and Machinery Houses, and Dwelling Houses of all sizes, from large Villas to small Cottages.

Photographs and Drawings of Buildings erected, and Testimonials to the Economy, Strength, and other great advantages of this system of Building, may be seen at the Company's Offices.

LIST OF BUILDINGS ERECTED, OR NOW IN PROGRESS, ESTIMATES, AND FULL INFORMATION MAY BE OBTAINED ON APPLICATION TO

DRAKE'S PATENT CONCRETE BUILDING COMPANY
(LIMITED),

METROPOLITAN BUILDINGS, QUEEN VICTORIA STREET, LONDON, E.C.

DRAKE'S PATENT CONCRETE BUILDING APPARATUS

IS WELL KNOWN AS THE MOST EFFICIENT, THE MOST EASILY AND ECONOMICALLY WORKED, AND
INCOMPARABLY THE MOST DURABLE AND SERVICEABLE THAT CAN BE OBTAINED.

SEVERAL INFERIOR COPIES AND INFRINGEMENTS

Have been offered at cheaper rates, but these are all VERY INFERIOR, and more expensive in working; and through rapid deterioration are much more costly, besides rendering the users liable to legal proceedings for infringement.

NUMEROUS TESTIMONIALS

May be seen at the Company's Offices, extending over seven years to the present time, all stating
DRAKE'S PATENT APPARATUS to be
VERY SUPERIOR TO ANY OTHER MEANS OF CONCRETE BUILDING.

THE COMPANY SUPPLY THE APPARATUS ON SALE OR HIRE.

Prices will be quoted on receipt of plans of any proposed Buildings.

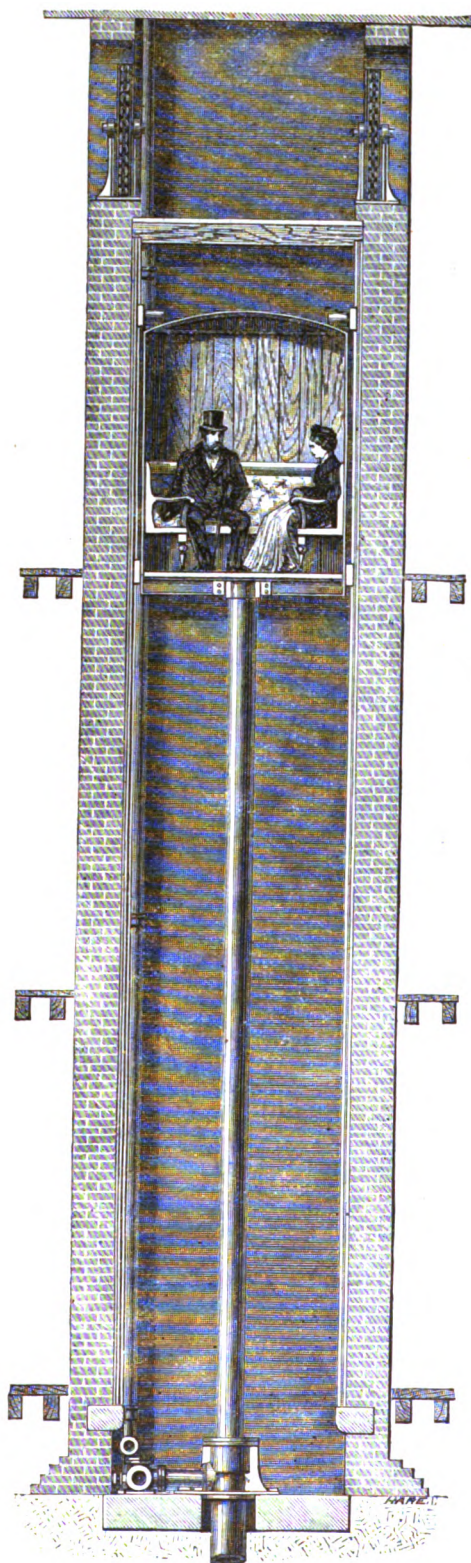
STONE BREAKING MACHINES

AND EVERY REQUISITE FOR CONCRETE BUILDING KEPT IN STOCK FOR SALE.

PRICES AND ALL INFORMATION MAY BE OBTAINED ON APPLICATION TO

DRAKE'S PATENT CONCRETE BUILDING COMPANY,
METROPOLITAN BUILDINGS, QUEEN VICTORIA STREET, LONDON, E.C.

3 0



Colyer's Improved Self-Acting Hydraulic Passenger Lifts.

These Lifts are fitted up with F. COLYER'S Improvements, viz. :—

There are no Girders of any description overhead.

The Chains are sunk in grooves in the side walls.

The Counter-Balances slide in guide irons.

The Movement is steady and noiseless.

The Stopping and Starting Gear are at all times perfectly under control. Self-acting gear fitted top and bottom.

NOTE.—Six Lifts of this class have been fitted up by F. COLYER at the St. Thomas's Hospital.

ADVANTAGES SECURED :

ABSOLUTE SAFETY.

PERFECT FREEDOM FROM SHOCK OR VIBRATION.

VERY EASY MOTION AND FREEDOM FROM NOISE.

ARE PERFECTLY UNDER CONTROL.

SOLE MANUFACTURERS :

GEORGE WALLER AND CO.,
ENGINEERS AND MACHINISTS,
PHENIX ENGINEERING WORKS,
HOLLAND STREET, LONDON, S.E. ;
AND AT STROUD, GLOUCESTERSHIRE.

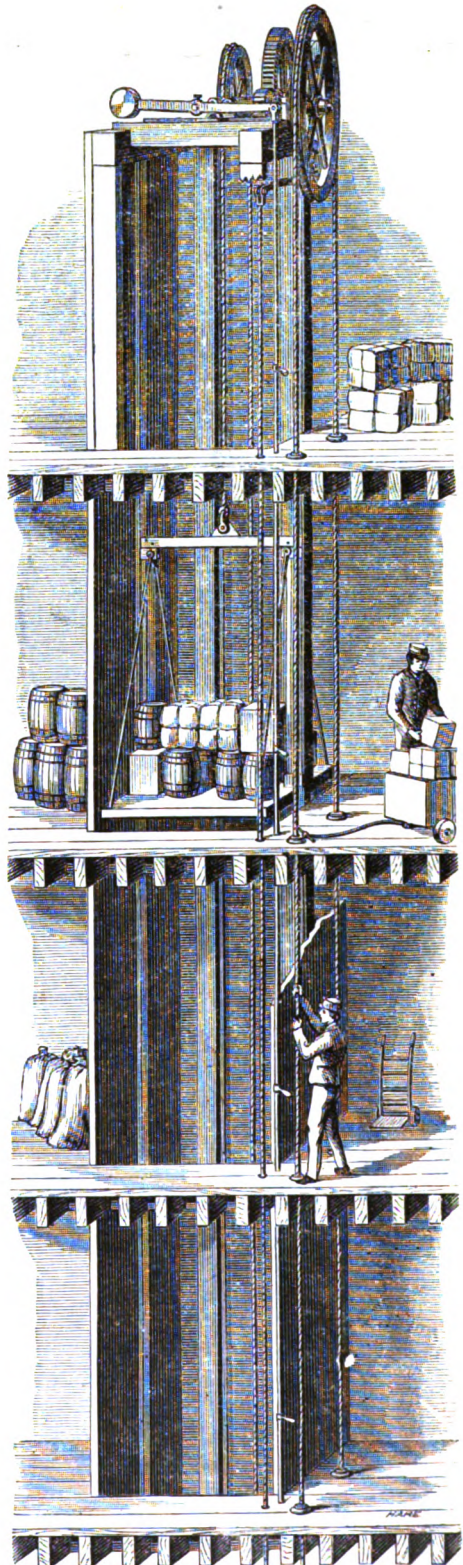
Colyer's Improved Hand-Power Lifting Apparatus.

These Lifts are for raising goods in Warehouses, or for general use in private houses. They are so constructed as to be capable of easy control by a rope through each floor for raising and lowering.

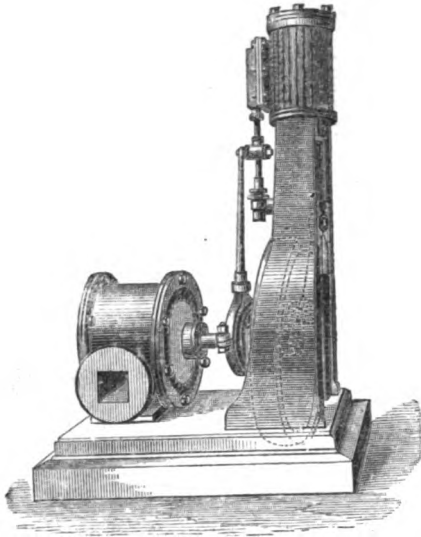
The Table and other parts are carefully counter-balanced to save labour. The speed of the Lift with say 8 to 10 cwt. is equal to 20 feet per minute, and proportionately quicker speeds for lighter weights.

Since F. COLYER joined our Firm, the above Lifts and those on the opposite page, are made by us under his immediate superintendence.

SOLE MANUFACTURERS:
GEORGE WALLER AND CO.,
 ENGINEERS AND MACHINISTS,
 PHŒNIX ENGINEERING WORKS,
 HOLLAND STREET, LONDON;
 AND AT STROUD, GLOUCESTERSHIRE.



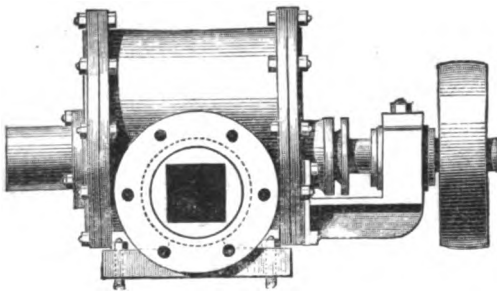
GAS EXHAUSTERS.



THE EXHAUSTERS ARE EXTRA LARGE FOR DRIVING
AT MODERATE SPEED.

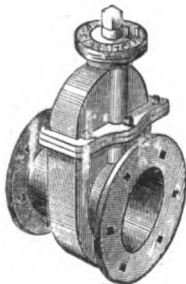
THEY ARE EASILY FIXED, AND ARE COMPLETE
ON ONE BASE PLATE.

Sizes, from 2000 to 10,000 feet per hour,
are kept in Stock.



Exhausters with one outer bearing, as illustrated, or
with two outer bearings for large sizes, and with
all the latest improvements.

Sizes, from 1000 feet to 30,000 feet, are kept in
Stock.



IMPROVED INDEX GAS VALVE.

These Valves are made with Circular wedged backs, and are
proved on both sides to 30 lb. per square inch.

Sizes, from 2 inches to 18 inches, are kept in Stock

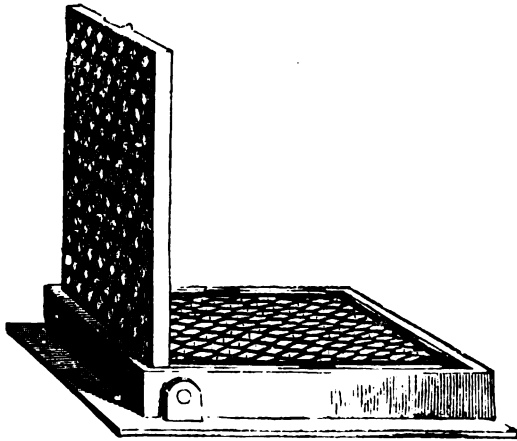
GEORGE WALLER AND CO.,

GAS ENGINEERS AND CONTRACTORS,

Sole Manufacturers of Beal's Improved Patent Gas Exhausters and Combined Engines,

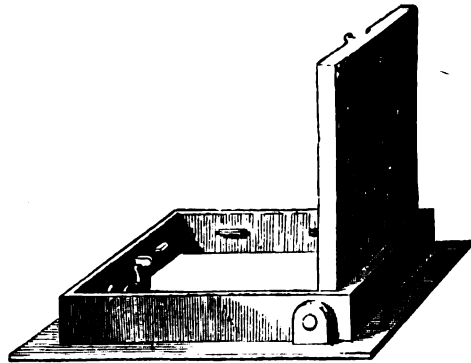
PHOENIX ENGINEERING WORKS, HOLLAND STREET, LONDON, S.E.; AND AT
STROUD, GLOUCESTERSHIRE.

SANITARY APPLIANCES.



SIDE ENTRANCE SAFETY-GRATES.

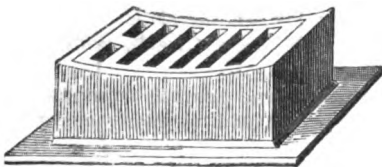
36 inches by 36 inches, 30 inches by 30 inches, and 30 inches by 26 inches, with wrought or cast doors and gratings.



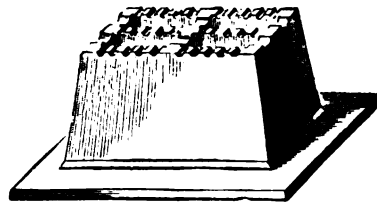
IRON DOORS AND FRAMES.

36 inches square, 30 inches by 26 inches, 24 inches, 20 inches, 18 inches, 15 inches, and 12 inches square, with wrought or cast doors.

SIDE ENTRANCE COVERS, AND DOORS AND FRAMES, with heavy cast or wrought doors, for road traffic.



GULLY GRATE.



VENTILATING GRATE.

Gully and Ventilating Grates, Oval Manhole Covers, Penstocks, Flushing Gates, Tide Valves, and Flushing Boxes of various sizes kept in Stock. Latham's Patent Ventilators, Soil Pipe Ventilators, and every description of Charcoal Deodorizing Apparatus.

PORTABLE PUMPING ENGINES ON HIRE.

GEORGE WALLER AND CO.,

SANITARY ENGINEERS AND CONTRACTORS,

PHENIX ENGINEERING WORKS, HOLLAND STREET, AND BEAR-GARDENS,
SOUTHWARK, S.E.; AND AT STROUD, GLOUCESTERSHIRE.

CHAPLIN'S PATENT STEAM ENGINES AND BOILERS.

The ORIGINAL Combined Vertical Engines and Boilers, introduced by MR. CHAPLIN in 1855.

Prize Medal, International Exhibition, 1862. Awarded for "Good Workmanship and Practical Utility."

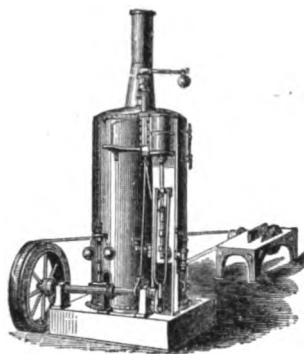
From the Strength, Simplicity, Compactness, and Economy of these PATENT STEAM ENGINES and BOILERS, they are extensively in use for a great variety of purposes, both at home and abroad.

The PATENT DOME BOILERS require no building in or chimney stalk, and burn inferior qualities of fuel.

The PATENT TUBULAR BOILERS, which are smaller and lighter in proportion to their power, are applied to Steam Cranes, Locomotives and Boats, and are used for the higher pressures.

Packing Boxes (*when required*) are charged for at cost price, extra.

STATIONARY ENGINES, No Building in, Strong and Economical.



The ENGINE FRAME AND BOILER are erected upon, and strongly attached to, a Cast-Iron Sole Plate, forming the Ash Pan, and may be erected and set to work by an ordinary mechanic. They are complete, with turned Fly-Wheel for Belt, Force Feed-Pump, Governor, &c., and are specially adapted for exportation, packing in small compass, and burning inferior qualities of fuel, dross, wood, peats, &c., by the aid of the Forced Combustion and Smoke-consuming Apparatus.

These ENGINES are specially designed and adapted for THRESHING, SAWING, PUMPING, WINDING, and DRIVING MACHINERY, GEARING for which purposes will be supplied extra, when required.

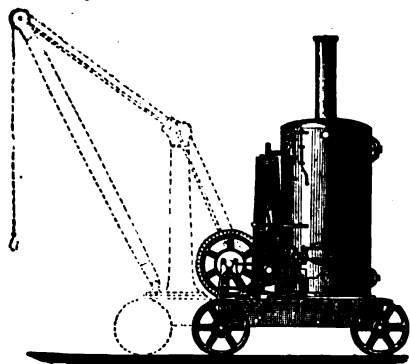
Sizes on Sole Plate.					Height.	Sizes on Sole Plate.					Height.
	ft.	in.	ft.	in.	ft.	in.		ft.	in.	ft.	in.
2 H.-p. Single Cyl.,	3	10	3	2	6	0	11 H.-p. Single Cyl.,	7	4	5	10
3 "	4	10	3	9	7	2	13 "	7	5	5	11
4 "	5	4	4	3	8	3	16 "	8	0	6	2
5 "	6	2	4	9	9	0	20 "	8	10	6	5
7 "	6	6	5	4	10	0	26 "	8	11	6	6
9 "	7	3	5	8	10	9	32 "	9	0	6	9

These ENGINES made PORTABLE ON TRUCK CARRIAGES and WHEELS. The BOILERS alone, with Chimney, Fire Grate, Steam Gauge, Safety Valve, Feed Valve, and other Mountings, are Half the Price of the Complete Engines.

HOISTING ENGINES, With or Without Pillar and Jib.

HOISTING ENGINES No. 1 are nearly similar to the Stationary Engines, but are mounted on a strong Iron Carriage, with Wheels, either plain for Roads or flanged for Rails. On front of frame is the Hoisting Gear, consisting of Hoisting Barrel and Winch Ends, Clutch, Foot Brake, Shut-off Steam Valve, &c., all under the easy control of ONE MAN.

HOISTING ENGINES No. 2 are the same in Construction and general arrangement as No. 1, but are fitted also with Pillar and Jib (*as dotted in Illustration*), adapted to swing about three-fourths round by Hand.



HOISTING ENGINES No. 1.				HOISTING ENGINES, No. 2. With PILLAR and JIB.			
Single Cylinder.	To Hoist up to 60 ft. per minute.	Pair Cylinders.	To Hoist up to 60 ft. per minute.	Single Cylinder.	To Hoist up to 60 ft. per minute.	Pair Cylinders.	To Hoist up to 60 ft. per minute.
2 H.-p.	12 cwt.	4 H.-p.	25 cwt.	2 H.-p.	12 cwt.	4 H.-p.	25 cwt.
3 "	20 "	6 "	35 "	3 "	20 "	6 "	35 "
4 "	25 "	8 "	45 "	4 "	25 "	8 "	45 "
5 "	30 "	10 "	60 "	5 "	30 "	10 "	60 "
7 "	40 "	..	..	7 "	40 "	..	..

Link Motions for Reversing, extra.

Full Particulars and Prices on Application.

ESTIMATES GIVEN FOR EVERY DESCRIPTION OF BOILERS AND IRONWORK.

WIMSHURST, HOLLICK AND CO., Engineers,

REGENT'S CANAL DOCK, 602, COMMERCIAL ROAD EAST, LONDON, E. (near Stepney Station).
CITY OFFICE : 34, WALBROOK, LONDON, E.C.

CHAPLIN'S PATENT STEAM ENGINES AND BOILERS.

Prize Medal, International Exhibition, 1862. Awarded for "Good Workmanship and Practical Utility."

STEAM CRANES, Portable or Fixed, for Railways, Wharves, &c.

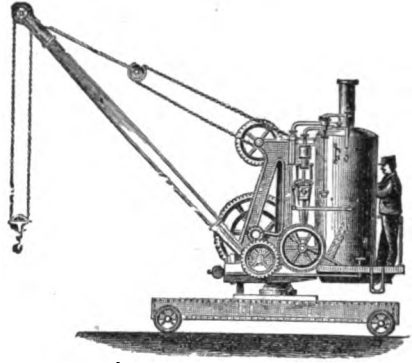
These STEAM CRANES are extensively in use at Goods Stations, Wharves, Quarries, Railway and Sewer Works, &c., and are adopted by all the leading Contractors at home and abroad. They are made especially strong, so as to ensure perfect safety in working, and they are invariably tested under Steam with the full load before leaving the Works. When desired, they are made to hoist and slew very rapidly.

Each Crane has a pair of Engines, ensuring regularity of motion, and is constructed to hoist or lower and turn entirely round in either direction by Steam, separately or simultaneously, as required. They are fitted with Link Motion, Foot Brake, &c., all under the easy control of ONE MAN.

The Engines and Boiler swing completely round on the central pillar, and assist in counterbalancing the load.

The Jib is adjustable by Hand Gear. When ordering, the required radius or sweep of Jib should be stated.

The Carriage is made (usually) of width to suit the ordinary Railway Gauge of 4 feet 8½ inches, and is supplied with Bolts for securing Cross Beams of Timber under Carriage. Clips, for fastening down to Rails, supplied extra, when required.



*** When desired, the Steam-power can be adapted to propel the Crane along the Rails.

No. 1.	Tested to Hoist with Return Chain and Block	1½ ton.
" 2.	"	" 2 "
" 3.	"	" 3 "
" 4.	"	" 4 "
" 5.	"	" 5 "
" 6.	"	" 7 "
" 7.	"	" 10 "

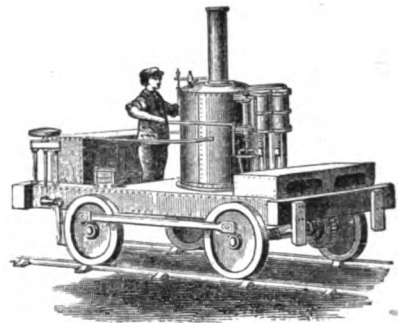
Larger Sizes Estimated for specially.

*** These Cranes were selected by H.M. Commissioners to receive and send away the heavy machinery in the International Exhibitions, 1862, 1871, and 1872.

CONTRACTORS' LOCOMOTIVES.

With new Patent Double-Flanged Railway Wheels, and Special Gearing, for ascending steep inclines or working round quick curves; or usual Single-Flanged Railway Wheels, for ordinary Contractors' purposes; to work on RAILS or TRAMWAYS of a gauge from 2 feet upwards.

Each ENGINE is complete with a pair of Cylinders, Link Motions for Reversing, Force Feed-Pump, Steam Regulator, Spring Balance, Safety Valve, &c. They are complete and efficient Locomotives, simple in construction, and the working parts easily got at for inspection or repair. The first cost, as well as the cost of maintenance, is much less than for ordinary Locomotives of same power, while they may be geared to draw a great weight, in proportion to their power, at a variable speed of from five to fifteen miles per hour—drawing a greater weight as the travelling speed is reduced.



6	Horse-power,	Tractive Power on an incline of 1 in 50,	10 Tons ;	Shipping Weight, about	3½ Tons.
9	"	"	" 20 "	"	4½ "
12	"	"	" 35 "	"	5½ "
15	"	"	" 45 "	"	7 "
21	"	"	" 60 "	"	8½ "
27	"	"	" 75 "	"	9½ "

For Shipment, these Engines are usually sent in One Package, ready for work on arrival.

Full Particulars and Prices on Application.

ESTIMATES GIVEN FOR EVERY DESCRIPTION OF BOILERS AND IRONWORK.

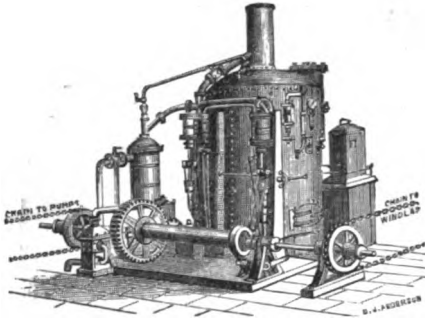
WIMSHURST, HOLLICK AND CO., Engineers,

REGENT'S CANAL DOCK, 602, COMMERCIAL ROAD EAST, LONDON, E. (near Stepney Station).
CITY OFFICE : 34, WALBROOK, LONDON, E.C.

CHAPLIN'S PATENT STEAM ENGINES AND BOILERS.

Prize Medal, International Exhibition, 1862. Awarded for "Good Workmanship and Practical Utility."

SHIPS' ENGINES AND DISTILLING APPARATUS.



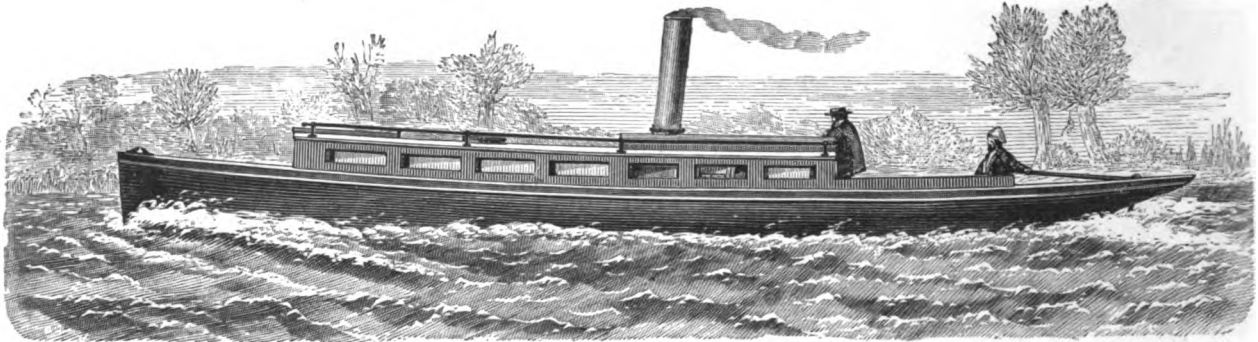
By Order in Council, Gazetted 5th December, 1865.

GOVERNMENT EMIGRANT, TROOP, and other PASSENGER VESSELS, fitted with this DISTILLING Apparatus, may sail with HALF THE QUANTITY OF FRESH WATER required under the Passengers' Act.

For Winding, Cooking and Distilling, Discharging Cargo, Working Pumps, Heaving Anchor, &c. The Fire from Boiler Furnace does the Cooking, without extra Expenditure of Fuel, and all the Steam used may be turned into fresh AERATED WATER.

The Distilling Apparatus may be had separately, for connecting to existing Boilers on board Steamers and other Vessels.

SIZES OF ENGINE, HOISTING GEAR, and COOKING APPARATUS, complete, Fitted on Board Ship, or delivered Packed.				SIZES OF DISTILLING APPARATUS, with "Distil-Aëerator" and Filter.
Horse-power.	CYLINDERS.		Dimensions OVER-ALL on Deck.	Height to Top of Boiler.
	Diam.	Stroke.		
3	One .. 5½ in.	× 11 in.	9 ft. 1 in. × 5 ft. 9 in.	6 ft. 6 in.
6	Pair .. 5½ "	× 11 "	10 " 0 " × 6 " 0 "	7 " 2 "
8	" .. 6 "	× 13 "	11 " 0 " × 6 " 9 "	8 " 0 "
10	" .. 7 "	× 14 "	13 " 0 " × 10 " 0 "	8 " 8 "
				No. 1 to produce 15 Gals. per Hour.
				" 2 " 23 "
				" 3 " 45 "
				" 4 " 60 "



SHIPS' LAUNCHES, PLEASURE BOATS, TUGS, AND CARGO BARGES,

Of Wood or Iron, either Open or Decked, with or without Cabins, and designed for River or Rough Water Navigation, FITTED WITH SINGLE OR TWIN-SCREW STEAM ENGINES AND BOILERS COMBINED.

HAND CRANES, SAW BENCHES, MORTAR MILLS, PUMPS, AND SHAFTING.

STEAM WINCHES, for Steamers or Cargo Barges, with or without Boilers and Connections.

BOAT-LOWERING APPARATUS (CHAPLIN'S PATENT), as used in Her Majesty's Navy and in Merchant Vessels.

DONKEY FEED ENGINES for Steam Boilers. DUPLEX PRESSURE BLOWING FANS.

TIPPING BUCKETS AND SKIPS, Welded; Mounted to Order.

BOILERS AND DUPLICATE PARTS OF ENGINES, &c., kept in Stock, so that Jobbing and thorough Repairs can be done without delay.

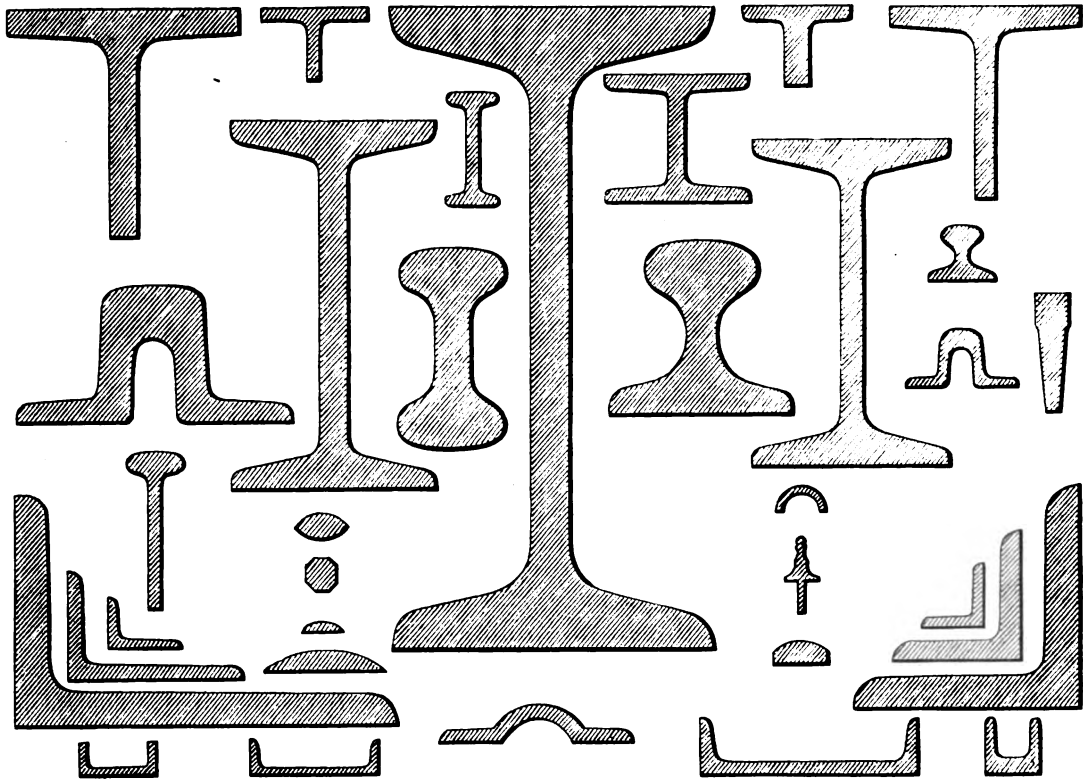
Detailed particulars of all our Manufactures may be had on application, with Testimonials and References to numerous and well-known Firms, at Home and Abroad, where our Engines, &c., may be seen at Work.

Estimates given for every description of Boilers and Ironwork.

WIMSHURST, HOLICK AND CO., Engineers,

REGENT'S CANAL DOCK, 602, COMMERCIAL ROAD EAST, LONDON, E. (near Stepney Station).

CITY OFFICE: 34, WALBROOK, LONDON, E.C.



BAR IRON—Welsh.

- „ Staffordshire.
- „ I B.
- „ B B H.
- „ S C.

LOW MOOR, BOWLING AND FARNLEY.

ANGLE IRON.

TEE IRON.

PATENT HORSE-SHOE IRON.

SASH AND MOULDING IRON.

RAILS—Bridge and Contractors'.

CHARCOAL IRON.

PLATES—Ship.

- „ Flitch.
- „ Boiler.
- „ Low Moor, &c.
- „ Charcoal.
- „ Chequered.

SHEETS—Best.

- „ S C.
- „ Charcoal.

HOOPS—Builders'.

- „ Coopers'.

GIRDERS—Rolled, Rivetted and Box.

JOISTS.

MOSER AND SONS,

IRON AND HARDWARE MERCHANTS,

178, 180, 182 AND 192, HIGH STREET, SOUTHWARK, LONDON, S.E.

3 P

IN STOCK.

IB IRON, FLATS, $\frac{1}{2}$ to 6 inches wide, up to 1 inch thick.	JOISTS AND GIRDERS, from 3 to 12 inches deep.
DITTO, DITTO, 7 to 8 inches wide, up to $1\frac{1}{4}$ inch thick.	FLITCH PLATES.
DITTO, ROUNDS, $\frac{3}{16}$ to 7 inches diameter.	RIBBED OR CHEQUERED PLATES.
DITTO, SQUARES, $\frac{1}{4}$ to 5 inches.	CHARCOAL SHEETS AND HORSE-NAIL RODS.
SC IRON, FLATS, $\frac{1}{2}$ to 6 inches wide, up to 2 inches thick.	GALVANIZED SHEETS.
DITTO, ROUNDS AND SQUARES, $\frac{1}{4}$ to 4 inches.	HOOPS—Builders', Coopers' and Coachmakers'.
BEST BOILER PLATES AND SHEETS, to 10 feet long, up to 3 feet wide.	FENCING WIRE—Black and Galvanized.
DITTO, DITTO, to 8 feet long, up to 4 feet wide.	STEEL—Shear, Cast, Spring and Blister.
LOW MOOR PLATES AND RIVET IRON	SHEET STEEL—Shear and Cast.
ANGLE IRON, $\frac{1}{2}$ to 5 inches, and $\frac{3}{8} \times \frac{5}{8}$ to $8 \times 4\frac{1}{2}$ inches.	RAILS—Bridge and Contractors'.
TEE IRON, $\frac{3}{4}$ to 5 inches, and $\frac{3}{4} \times 1$ to 5×6 inches.	FIRE-BAR IRON.
	OVAL, OCTAGON AND HALF-ROUND IRON.
	SASH IRON.
	CHANNEL IRON.
	BOAT-GUARD IRON.

Books of Sections of Iron on application.

Description of Illustrations on pages 476, 477, 478.

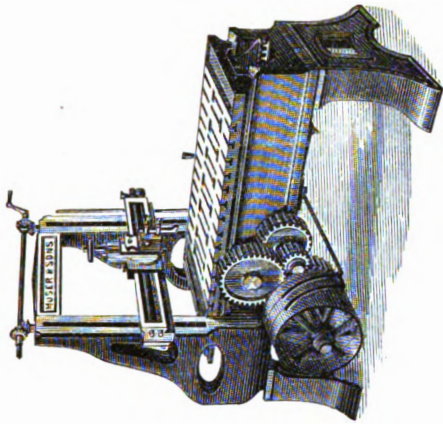
Fig. 1. Needle Lubricator.	Fig. 155. Smiths' Bick Iron.	Fig. 304. Screw Plate.
3. Foot Lathe.	156. Standing Bench Vice.	335. Hammer (Engineers').
16. Drilling Machine.	156A. Hand Vice. [Stand.	336. Ditto (Boiler Makers').
20. Punching and Shearing Machine.	157. Standing Vice, with Cast-Iron	340. Ditto (Smiths' Hand, Cross
41. Screw Press, with Swan Neck.	159. Circular Forge Bellows, with	Pane).
51. Hammer (Planishing).	Double Blast.	410. Shovel, London Pattern.
55. Ditto (Square Face).	160. Water Tue Iron.	413. Ditto, Gravel or Round Mouth.
64. Bick Iron (Tinmen's).	164. Double Smiths' Trough.	417. Ditto (Stokers').
66. Funnel Stake.	165. Swage Block.	431. Coke Shovel, Grated.
70. Round Bottom Stake.	170. Drilling Pillar, with Sliding Screw.	435A. Ditto Fork, Cast Steel.
76. Creasing Stake.	181. Drill Brace.	443. Pick.
87. Block Shears.	186. Ratchet Brace.	449. Crow Bar.
88. Scotch Hand Shears.	189. Ball Ratchet Brace.	471. Galvanized Pail.
106. Weston's Differential Pulley Block.	190. Ratchet Brace, with Patent Loose	473. Grindstone, fitted with Iron
107. Single-Purchase Lifting Crab.	Centre.	Trough.
108. Mounted Rubbish Wheel, or	200. Parallel Bench Vice.	500. Circular Saw.
Snatch Pulley.	202. Small Bench Vice.	501. Cross-Cut Saw.
114. Pulley Block, Snatch, best London	205. Sash Cramp.	509. Hand Saw.
make.	209. Coachmakers' Cramp.	517. Frame Saw, for Iron.
116. Pulley Block, 3 Sheave, best	212. Permanent Way Cramp, or Jim	621. Shell Auger Bit.
London make.	Crow.	662. Smiths' Brace.
132. Bottle Jack, with Wrought-Iron	251. Screw Wrench (Double).	674. Screw Auger Bit.
Case.	260. Spanner (Clyburn's bent).	701. Wing Compass.
133. Tripod, or Cotton Jack.	260A. Ditto (Brittain's Patent).	709. Pliers, Flat or Round Nose.
135. Haley's Jack.	261. Ditto, (Budding's).	730. Carpenters' Axe.
136. Traversing Jack.	263. Spanner.	752. Platelayers' Adze.
150. Bowden's Patent Forge.	300. Stocks and Dies, (Engineers'),	779. Plumbers' Ladle.
152. Anvil (Smiths').	Whitworth's Thread.	

Every description of Tools kept in Stock, suitable for Contractors, Builders, Engineers, Smiths, Coppersmiths, Tinmen; also Chains, Bolts and Nuts, Screws, Nails, Spikes, Castings, Ships' Stores, &c.

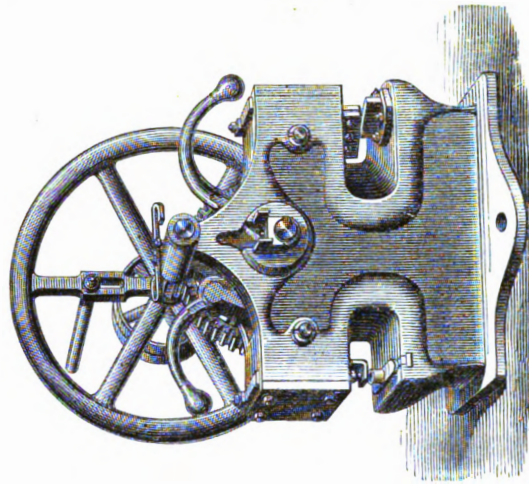
MOSER AND SONS,

IRON AND HARDWARE MERCHANTS,

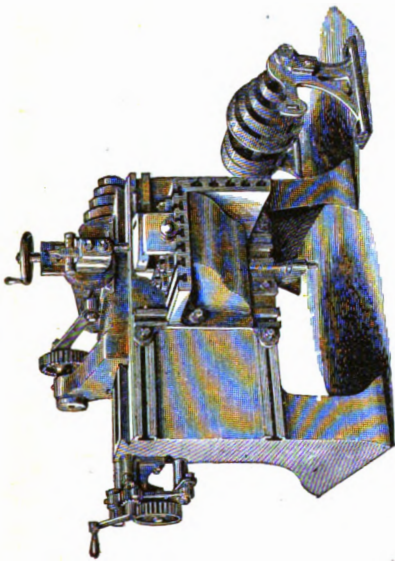
178, 180, 182 AND 192, HIGH STREET, SOUTHWARK, LONDON, S.E.



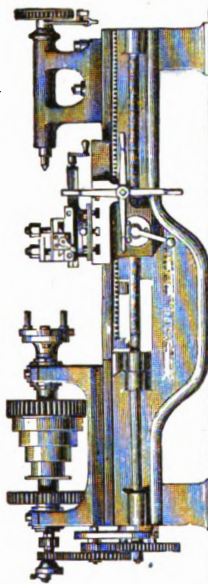
PLANING MACHINE.



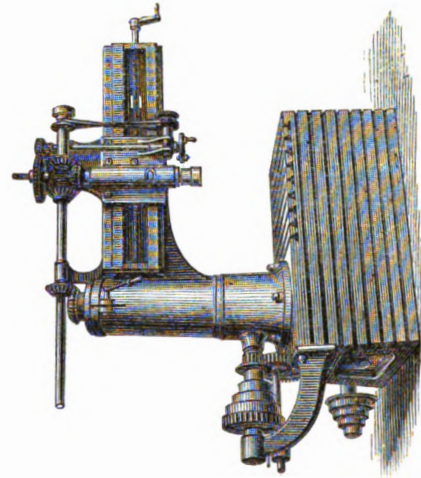
PUNCHING AND SHEARING MACHINE.



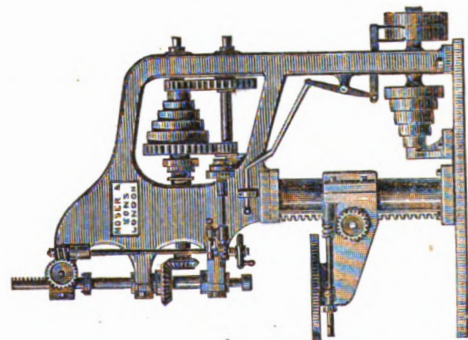
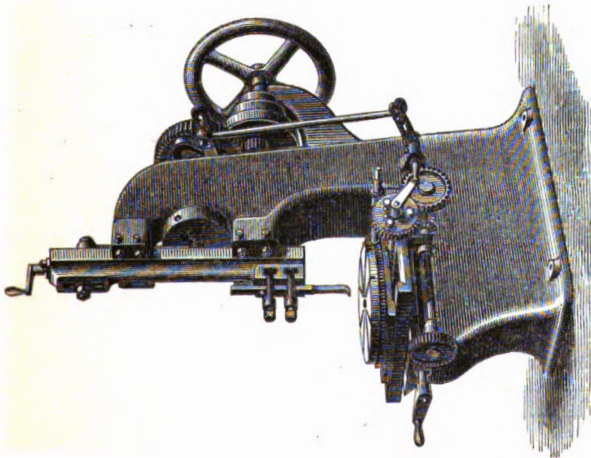
SHAPING MACHINE.



SLOTING MACHINE.



RADIAL DRILLING MACHINE.

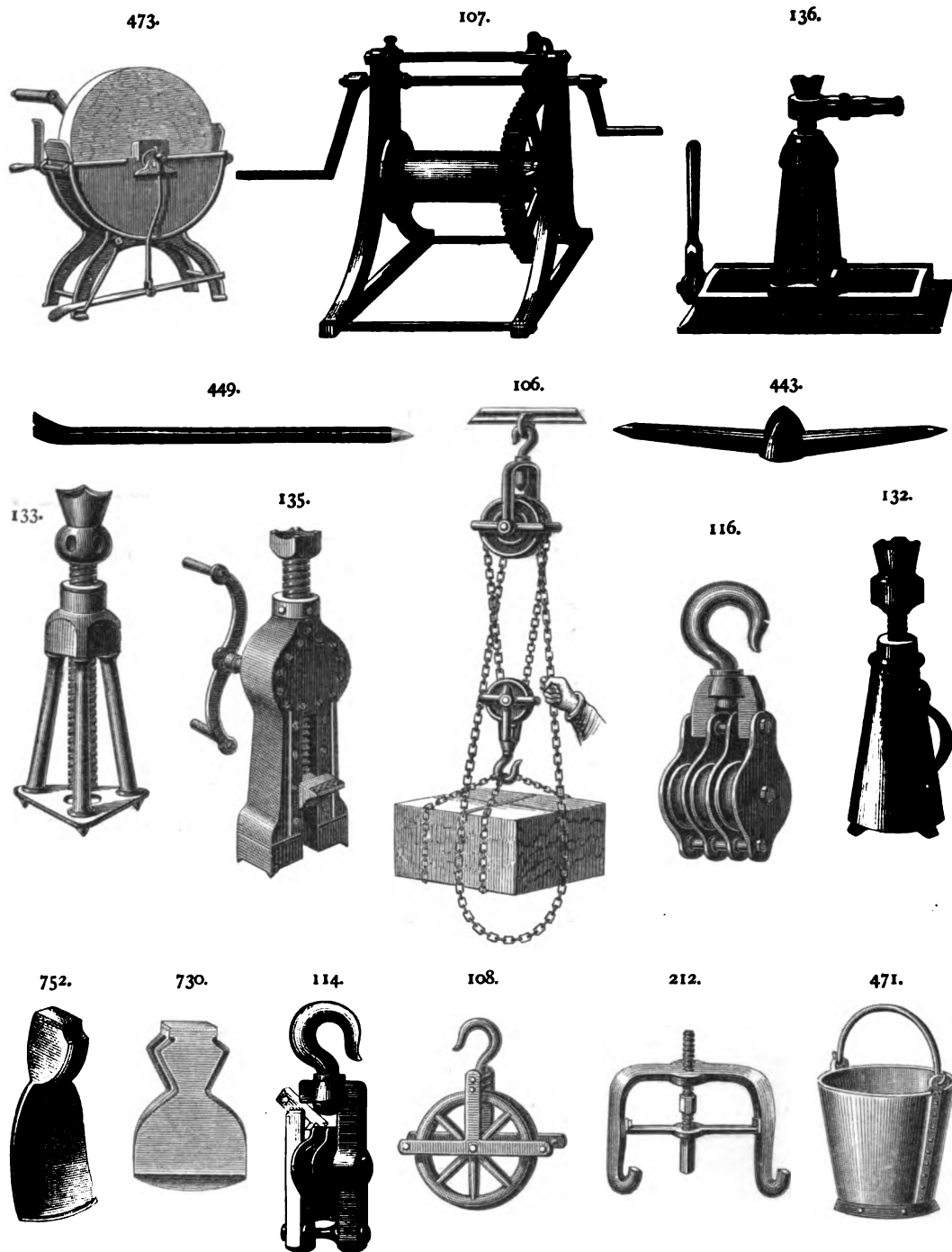


DRILLING MACHINE.

MOSER AND SONS,

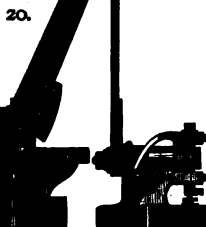
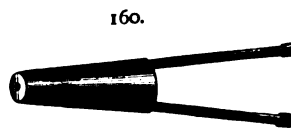
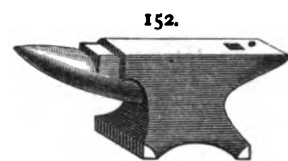
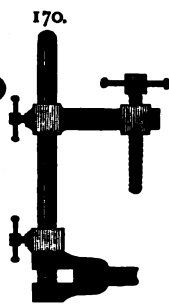
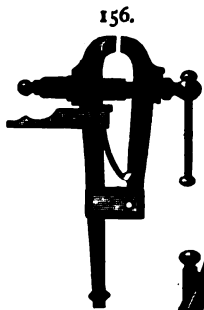
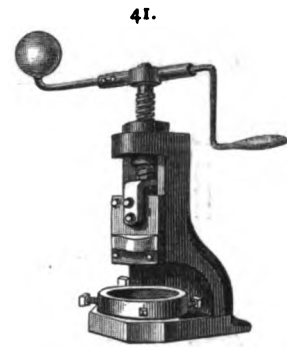
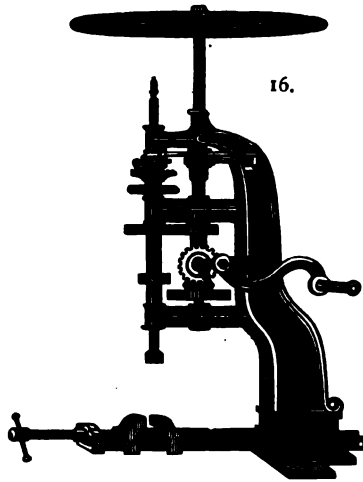
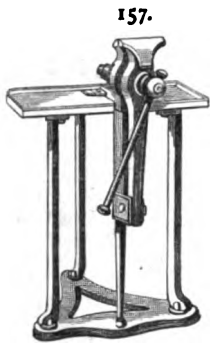
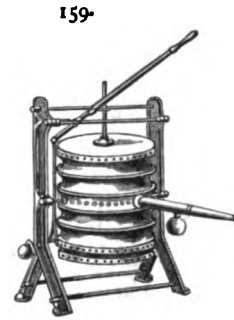
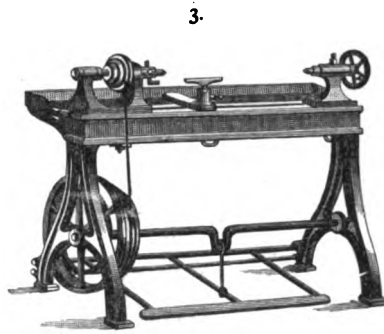
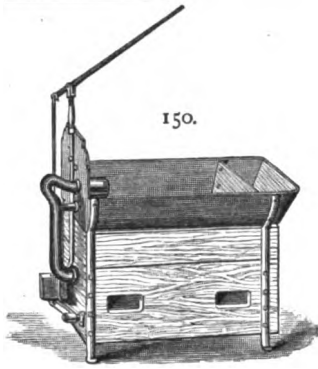
IRON AND HARDWARE MERCHANTS,

178, 180, 182 AND 192, HIGH STREET, SOUTHWARK, LONDON, S.E.

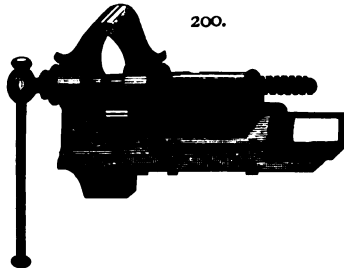


For description of Illustrations, see page 474.

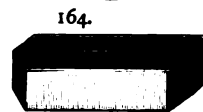
MOSER AND SONS,
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156A.



200.



164.

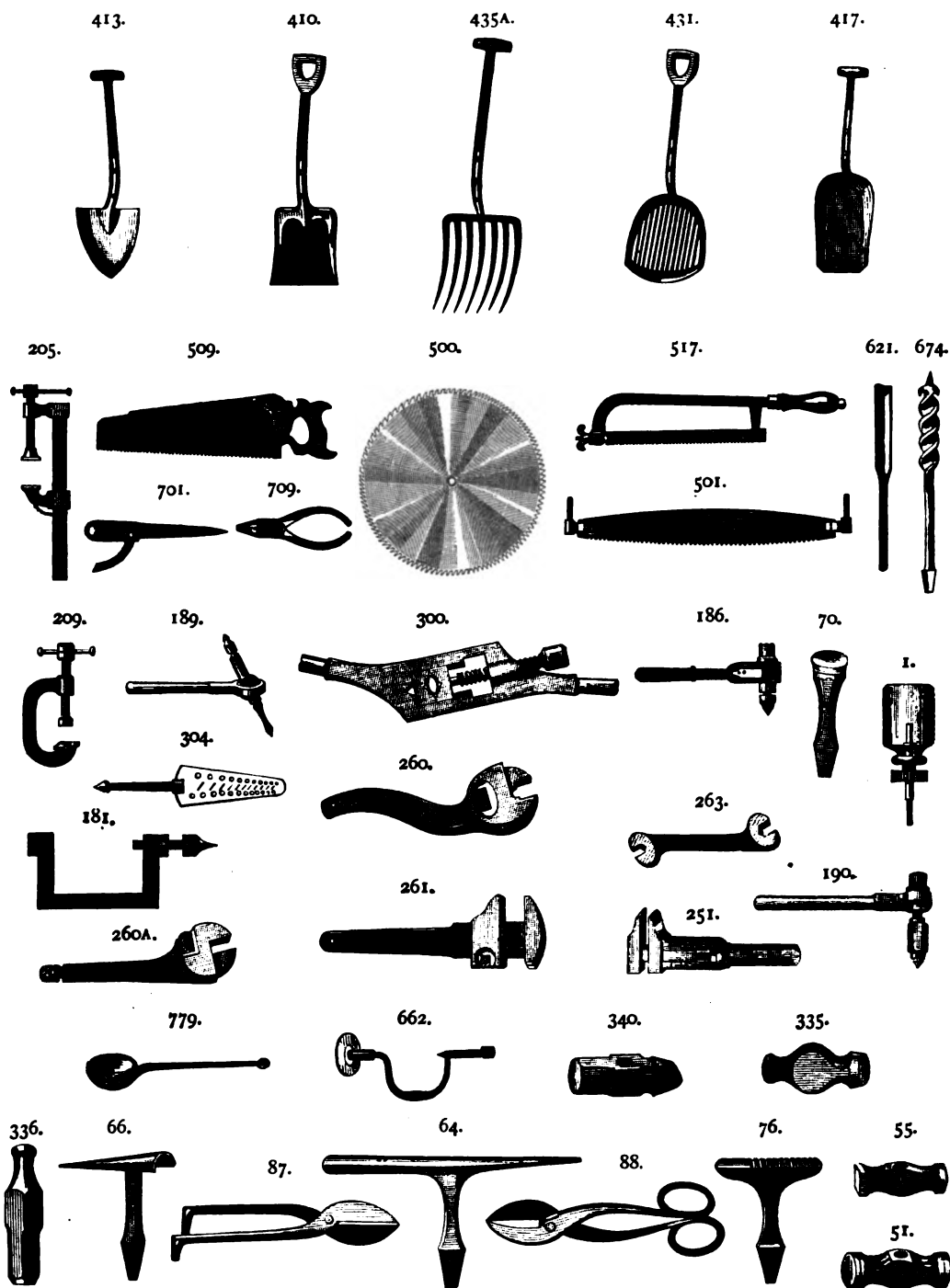


165.

Front View. Side View.

For description of Illustrations, see page 474.

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For description of illustrations, see page 474.

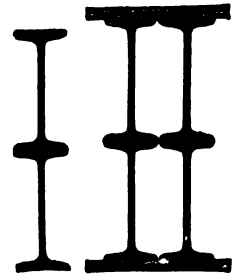
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HOMAN'S PATENT GIRDERS, JOISTS, AND FIRE-PROOF FLOORS

ARE SUPERSEDING EVERY OTHER KIND,

AND ARE NOW ADOPTED IN CONSTRUCTION THROUGHOUT THE WORLD.



"From some experiments which took place in London, on Tuesday, at the Grove, Southwark, with Mr. Kirkaldy's Testing Machine, it would seem that we are on the eve of a complete revolution in the strength and in the economy both of material and manufacture of Rolled Iron Girders, and that since the days of Mr. Fairbairn's celebrated Girder of 1846 there has been nothing so important to its purpose as the invention we are about to describe."—RYLAND'S IRON TRADE CIRCULAR.

"Taking the results as they stand, and making the best and worst of them, they exhibit a clear gain of from 30 to 40 per cent. over the ordinary system."—MECHANICS' MAGAZINE.

"Of the details of the experiments there is no doubt, and we can only say that the results were beyond what anyone could have expected. They cannot fail to strike the attention of Architects and Engineers, and we trust that they may lead to a greatly increased use of wrought iron in the construction of buildings."—ENGINEERING.

HOMAN'S PATENT IMPROVED FIRE-PROOF FLOORS



SECURE THE FOLLOWING ADVANTAGES:

- First.—A saving of *one-third* of the iron usually employed.
- Second.—No iron bars or wood fillets are required to support the concrete.
- Third.—No counterceiling or laths are required, a perfect key for the plaster ceiling being furnished by the rough concrete.
- Fourth.—The finished floor forms a construction of the strongest kind, the tensional strains of the load being taken by the iron, and the compressive strains by the concrete.
- Fifth.—The depth of the floor is less than any other kind, and thereby secures greater height for the rooms.
- Sixth.—The execution of the work requires no special appliances, and may be effected by any labourer.
- Seventh.—The cost is less than any other kind, and it IS THE ONLY SYSTEM OF FIRE-PROOF CONSTRUCTION THAT HAS SUCCESSFULLY RESISTED THE ACTION OF A GREAT FIRE.

The pressing necessity for the general adoption of Fire-proof Construction has been strikingly pointed out by the large number of disastrous fires that have lately occurred.

With the view of meeting the objection that it costs more than ordinary construction, we have made arrangements to execute the best Fire-proof Floors—the part of the building on which the whole question turns—at a trifling advance in cost over the ordinary combustible floors.

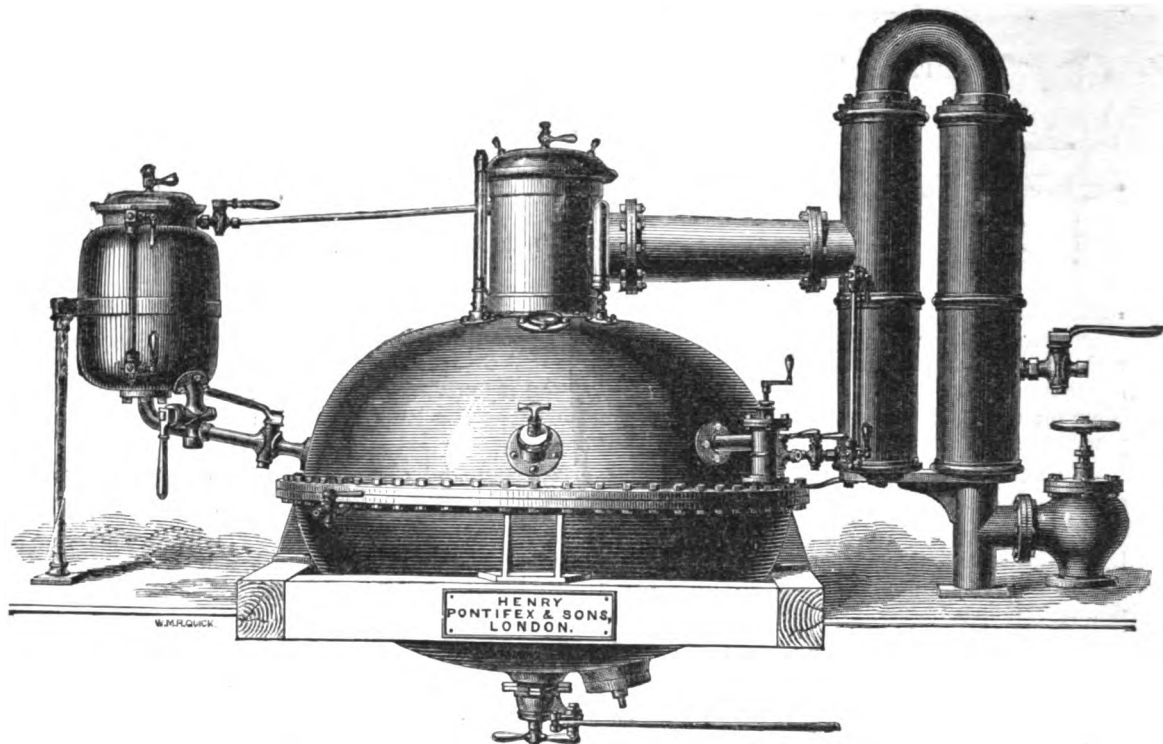
Joists, Riveted Girders, Column Roofs, Bridges, and every kind of wrought and cast iron and Smiths' work for Building purposes.

CONSULTATIONS, DRAWINGS, AND ESTIMATES, FREE OF COST.

The Fire-proof Construction, and Patent Girders known as Phillips's Patent, Double Flanged Girders, and Solid Flanged Girders, are made and sold under Mr. Homan's Patents.

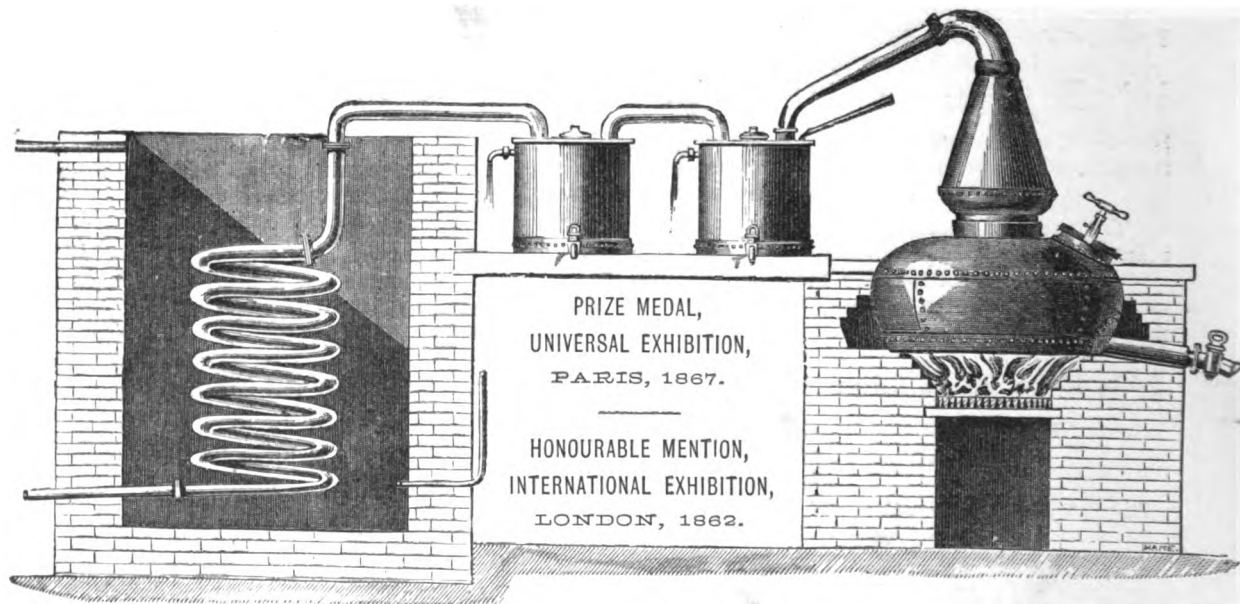
HOMAN AND ROGERS,

17, GRACECHURCH STREET, LONDON, E.C.; NELSON WHARF WORKS,
MILLWALL, E.



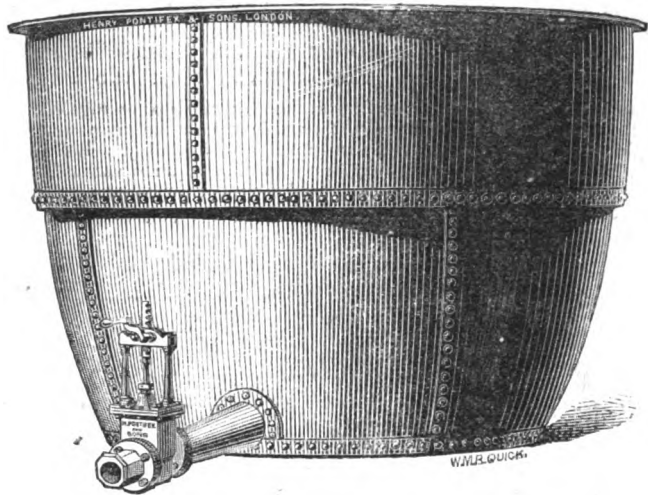
STEAM ENGINES, BOILERS, SUGAR CANE MILLS, CLARIFIERS, FILTERS, VACUUM PANS AND PUMPS, WETZEL PANS, HEATERS, TEACHES, DIPPERS, &c., AND ALL APPARATUS AND MACHINERY FOR SUGAR MANUFACTORIES AND REFINERIES; RUM STILLS TO WORK BY FIRE OR STEAM, WITH RETORTS OR PATENT CONDENSING HEADS; AND ALL KINDS OF MACHINERY FOR CRUSHING, GRINDING, PUMPING, PRESSING, &c.

Prices according to size and description.

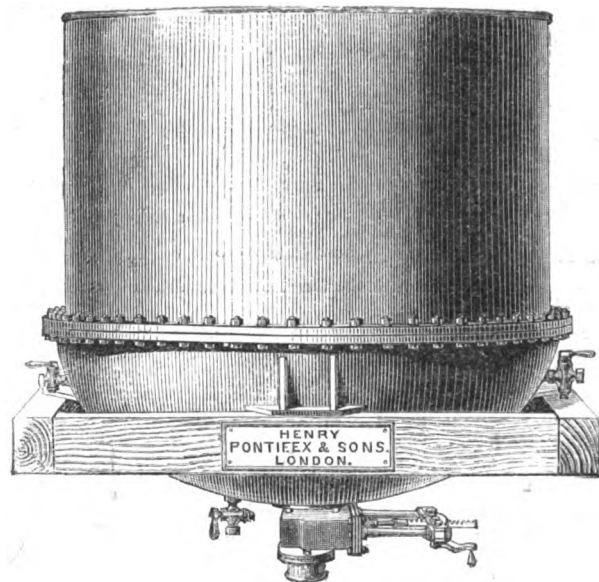


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ALBION WORKS, KING'S CROSS, LONDON.

ATTEMPERATORS (all kinds).
 ASHBY'S PATENT REFRIGERATOR.
 BAR FITTINGS.
 BEER ENGINES, &c.
 BOILING TUBS AND COILS.
 BOILERS.
 BRANDS.
 BRIDLE'S PATENT REFRIGERATOR.
 BRASS WORK (all kinds).
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OPEN BREWING COPPER.



STEAM BREWING COPPER.

SETTLING BACKS.
 STILLIONS.
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STEAM-JACKETED COPPERS.
 STEAM ENGINES AND BOILERS.
 UNION CLEANSING CASKS.
 VATS.

HENRY PONTIFEX AND SONS,

ALBION WORKS, KING'S CROSS, LONDON.

WONDERFUL DISCOVERY FOR COOLING AND HEATING LIQUIDS.

LAWRENCE'S PATENT CAPILLARY REFRIGERATOR.

FOR COOLING BREWERS' AND DISTILLERS' WORTS, THICK AND THIN MASH, MILK, &c. ; ALSO FOR CONDENSING STEAM AND PURIFYING WATER.

In these Refrigerators the cooling surfaces are made of corrugated copper, and the ends of gun metal. They combine all the advantages that can be desired, viz. incredible cooling powers, the total or partial exposure of the fluid to the air at pleasure during cooling, surpassing cleanliness, durability, and simplicity of construction.

For the vertical form of Refrigerator the fall required varies from 18 inches to 4 feet 6 inches, and the flat form from 3 inches to 12 inches. Their cooling power is so great that Brewers' Wort of the heaviest gravity may be reduced to within half a degree Fahr. of the water employed.

FIG. 1.

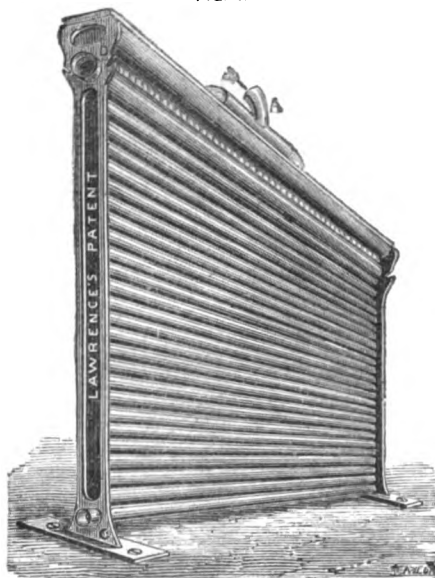
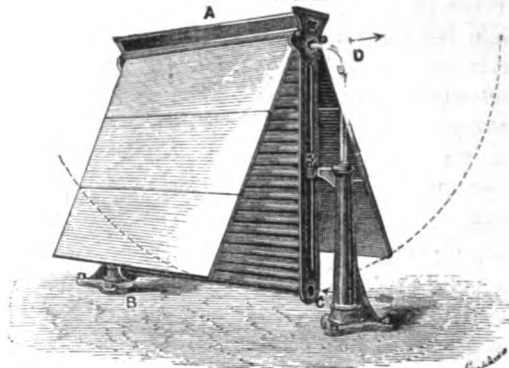


FIG. 2.



PRICES.

To cool from 180° to within about 2° of water used.

		£	s.	d.
5 Barrels per hour	.. .. .	16	10	0
12 "	" " " " " "	39	12	0
40 "	" " " " " "	110	0	0
100 "	" " " " " "	237	10	0

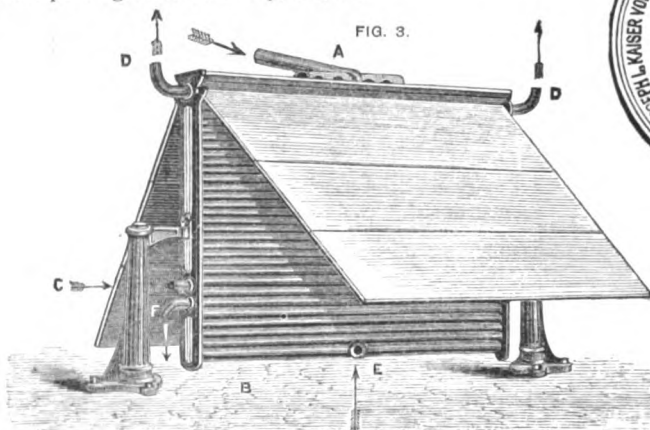
Sampling and Small Refrigerators, 1 Barrel per hour, £3 10s.; and 3 Barrels per hour, £10 8s.

PRICES OF INTERMEDIATE AND OTHER SIZES ON APPLICATION.

These Refrigerators have taken numerous Medals and First Prizes at English and Continental Shows: among others, the following:

The Grand Medal of Progress at Vienna. First Silver Medal at Warsaw. Silver Medal of the Royal Agricultural Society of England. Silver Medal of the Royal Worcester Agricultural Society. Silver Medal of the Manchester and Liverpool Agricultural Society, &c., &c.

FIG. 3.



REFERENCE TO ILLUSTRATIONS.

Fig. 1 represents the Refrigerator of the ordinary kind, but without bottom receiving trough.

Fig. 2 shows Refrigerator mounted on trunnions for swinging, and cover-downs to exclude the air.

Fig. 3 represents a combined Refrigerator, with trunnions and cover-downs, arranged for ice water and river water. This description will cool down to 40° Fahr.

LAWRENCE AND CO.,

BREWERS' ARCHITECTS, CONTRACTORS, ENGINEERS, COPPERSMITHS, IRON AND BRASS FOUNDERS, &c.

LONDON OFFICE: 22, ST. MARY AXE. WORKS: LATIMER ROAD, NOTTING HILL, W.

PRESERVATION OF MILK. IMPORTANT TO DAIRY FARMERS.

Thousands of these Refrigerators are now in daily use at home and abroad, for cooling milk and other fluids. By their aid, milk intended for transit, or for the making of butter or cheese, may be cooled as soon as it leaves the cow, and before any injurious change can possibly have taken place. It has long been a well-known fact that milk is preserved in proportion to the rapidity with which it is cooled. Why this is so has never been satisfactorily explained, but recent scientific investigations have proved, beyond a doubt, that when milk is *suddenly* cooled, the infusoria or vital organisms (the cause of rapid decomposition) are destroyed, and the milk is consequently preserved; whereas, if cooled by *slow degrees*, living infusoria will still be found in it.

By passing warm water through the Refrigerator, instead of cold, the temperature of the milk may be readily raised to any degree required, which, in cold weather, is a great advantage in cheese making.



THE PRICES OF THESE REFRIGERATORS ARE:

For Cooling 60 Gallons of Milk per hour ..	£	s.	d.	For Cooling 150 Gallons of Milk per hour ..	£	s.	d.
" 100 " " "	3	15	0	" 200 " " "	7	5	0
" 300 " " "	5	0	0	" 300 " " "	9	10	0
For Cooling 300 Gallons of Milk per hour ..				£14	0	0	

Fittings extra—Prices on application.

SPECIAL QUOTATIONS TO MERCHANTS FOR THE CONTINENT AND ABROAD.

L. AND CO. desire to call especial attention to the following among their Specialities:

LAWRENCE'S PATENT REMOVABLE INTERNAL MASHING MACHINE.

It is the best form of an Internal Rake Machine, and dispenses with cogs on the inner circumference of tun, is fitted with distributing apparatus for raising and regulating the heat of the mash.

IMPROVED PATENT SELF-ACTING EXTERNAL MASHING MACHINES.

PATENT FRICTIONLESS CLOSEWAY SPARGER.

IMPROVED STAR CORRUGATED, AND ROUND AND FLAT TUBULAR ATTEMPERATORS.

PARACHUTE AND OTHER SKIMMING APPARATUS.

IMPROVED MALT ROLLERS. PATENT FERMENTING APPARATUS.

COPPERS, STEAM-JACKET PANS, BOILING COILS, CAST-IRON MASH TUNS AND TANKS, BRASS WORK, PUMPS, COCKS, VALVES, AND EVERY DESCRIPTION OF BREWING MACHINERY.

Testimonials, Illustrations, and Particulars on application.

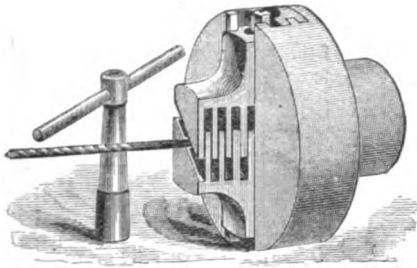
LAWRENCE AND CO.,

BREWERS' ARCHITECTS, CONTRACTORS, ENGINEERS, COPPERSMITHS, IRON AND BRASS
FOUNDERS, &c.

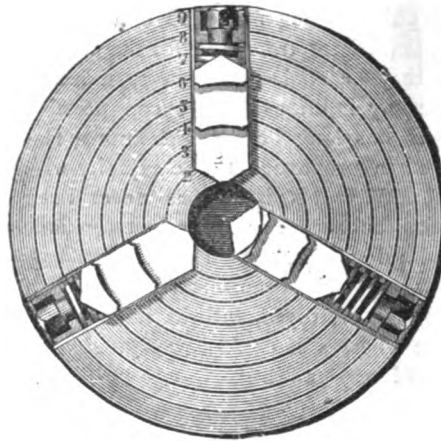
LONDON OFFICE: 22, ST. MARY AXE. WORKS: LATIMER ROAD, NOTTING HILL, W.

3 Q 2

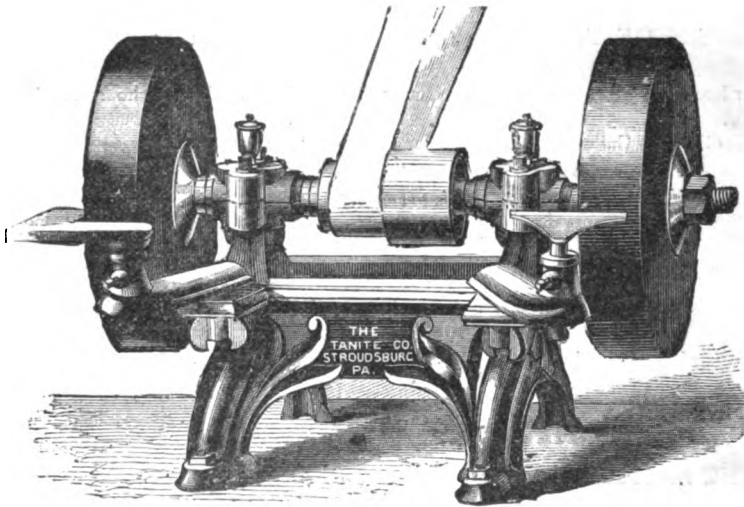
FOREIGN TOOLS AND MACHINERY.



LITTLE GIANT DRILL CHUCK.



WESTCOTT'S LATHE CHUCK.

LIGHTNING
SCREW-PLATE.

TANITE EMERY GRINDING MACHINE.

ELLIPTIC BOILER
TUBE CLEANER.

M. SELIG, JUNIOR, AND CO.,

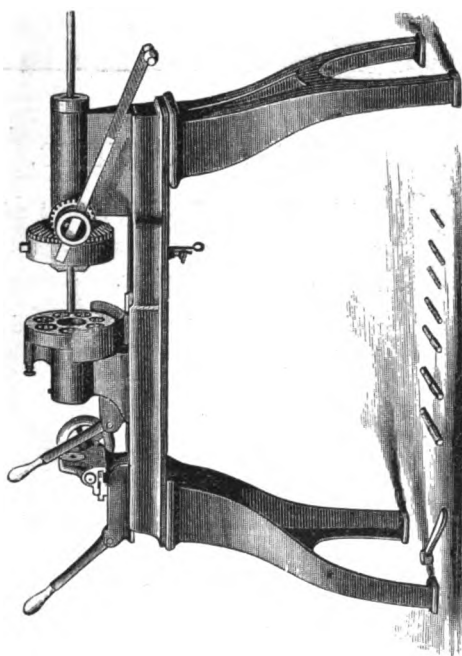
IMPORTERS OF AMERICAN AND OTHER FOREIGN TOOLS AND MACHINERY;

Wholesale and Export Machinery Merchants;

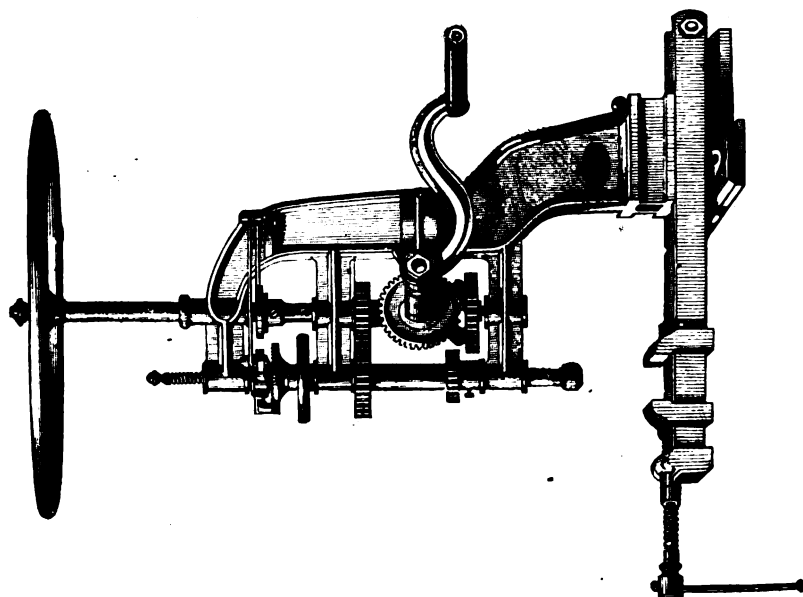
SOLE EUROPEAN AGENTS FOR THE TANITE CO.'S SOLID EMERY WHEELS AND EMERY MACHINES:

85, QUEEN VICTORIA STREET, LONDON, E.C.

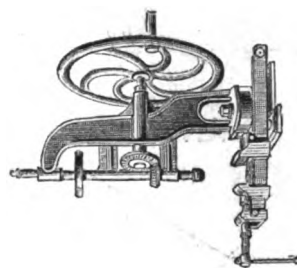
FOREIGN TOOLS AND MACHINERY.



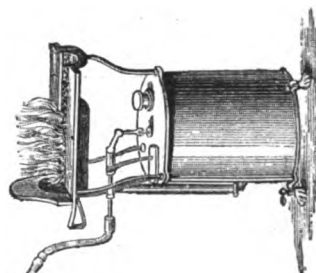
"LIGHTNING" SCREWING AND TAPPING MACHINE.



BENCH DRILLING MACHINE.



HAND DRILLING MACHINE.



PAT LEVER FORGE.

M. SELIG, JUNIOR, AND CO.,

IMPORTERS OF AMERICAN AND OTHER FOREIGN TOOLS AND MACHINERY ;

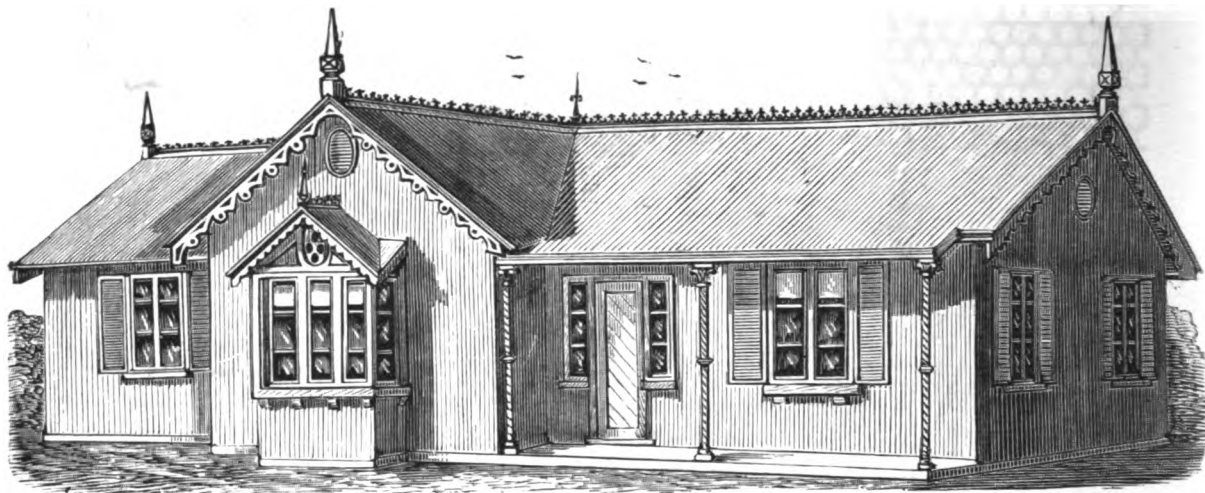
Wholesale and Export Machinery Merchants ;

SOLE EUROPEAN AGENTS FOR THE TANITE CO.'S SOLID EMERY WHEELS AND EMERY MACHINES :

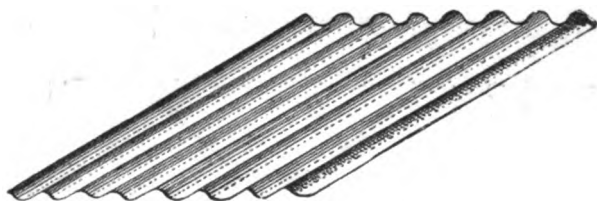
85, QUEEN VICTORIA STREET, LONDON, E.C.

IRON BUILDINGS, ROOFS, AND GIRDERS.

FREDERICK BRABY AND CO. having recently completed, at their Deptford Works, large additions to the Machinery, consisting of Steam Hammers, Presses, and Wood-working Machines, for the special manufacture of Iron Buildings, Roofs, Girders, and Constructional Iron and Wood Work of every description, are now in a position to undertake and promptly execute any Contracts that may be entrusted to them.



GALVANIZED CORRUGATED ROOFING SHEETS.



This form of Roofing is well adapted for covering stables, farm buildings, out-houses, piggeries, cart sheds, &c.

Any farm labourer can fix it, and no boarding is required.

ZINC FOR ROOFING AND DECORATION.

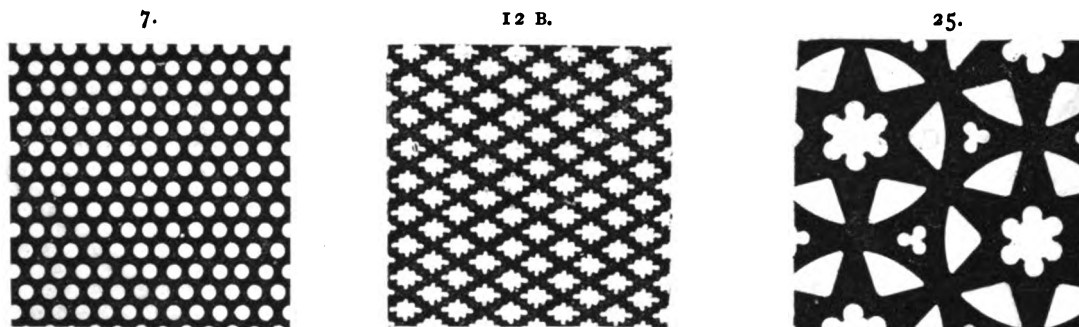
DRAWINGS, ESTIMATES, AND FULL DETAILS ON APPLICATION.

STAMPED ZINC FOR MANSARD ROOFS, DORMERS, MOULDINGS, FRIEZES, IN EVERY VARIETY.

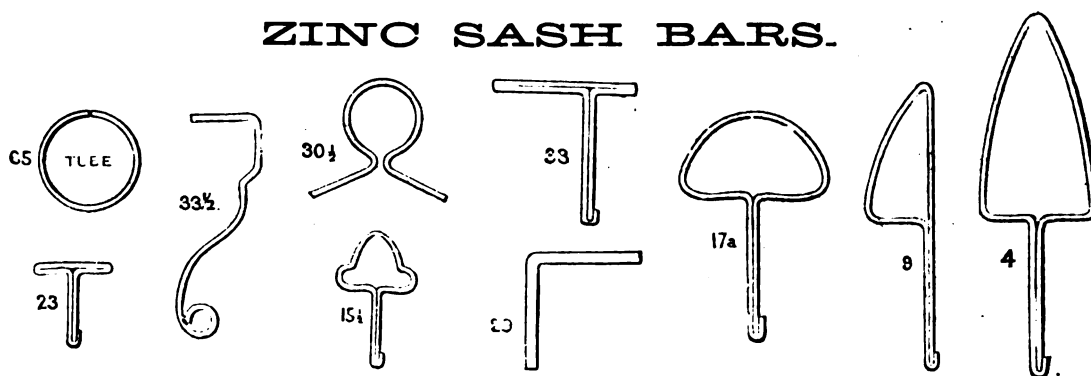
ARCHITECTS' OWN DESIGNS CARRIED OUT.

FREDERICK BRABY AND CO., Limited,
ENGINEERS AND CONTRACTORS, FITZROY WORKS, EUSTON ROAD, LONDON, N.W.
AND IDA WHARF AND VICTORIA WORKS, DEPTFORD.
ALSO AT LIVERPOOL AND GLASGOW.

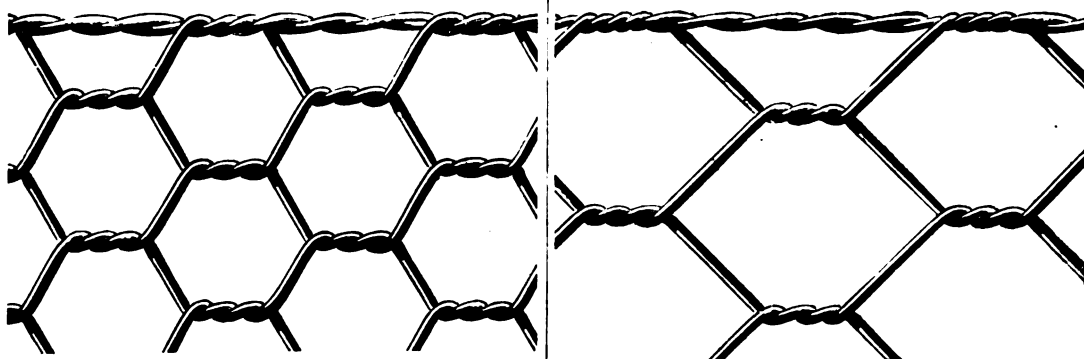
PERFORATED ZINC AND CARD BOARD.



ZINC SASH BARS.



3/4-INCH MESH WIRE NETTING. 1-INCH MESH WIRE NETTING.



Suitable for Aviaries, Cages, Guards for Windows, &c., made any width up to 4 feet.

Suitable for Pheasantries, and a protection against small birds generally, made any width up to 4 feet.

Perforators of Zinc, Copper, Brass, Iron, and Card Boards.

FREDERICK BRABY AND CO., Limited,
ENGINEERS AND CONTRACTORS, FITZROY WORKS, EUSTON ROAD, LONDON, N.W.
AND IDA WHARF AND VICTORIA WORKS, DEPTFORD.
ALSO AT LIVERPOOL AND GLASGOW.

MOORE AND MANBY, DUDLEY.

**Contractors to Her
Majesty's Government**



**And the Council of
State for India.**

REGISTERED TRADE MARKS.



M & M.



SAXON.

DESCRIPTIONS OF MANUFACTURED IRON OF BEST QUALITIES.

FLAT BARS, FROM $\frac{3}{8}$ TO 12 INCHES WIDE.
 ROUND DITTO, FROM $\frac{1}{8}$ TO 8 INCHES DIAMETER. SQUARE DITTO, FROM $\frac{1}{8}$ TO 5 INCHES.
 HALF-ROUND, FEATHER AND SQUARE EDGE, TO 6 INCHES WIDE.
 BEVILLED, OCTAGON, HEXAGON, OVAL, MOULDING, AND EVERY OTHER DESCRIPTION OF FANCY IRON.
 BEST, BEST BEST, AND TREBLE BEST RIVET IRON, PLATING BARS, &C.
 HOOP AND STRIP IRON, FROM $\frac{1}{2}$ TO 10 INCHES WIDE.
 SHEETS—SINGLE, DOUBLE, AND LATTIN.
 ROOFING SHEETS—CORRUGATED AND GALVANIZED IRON.
 NAIL SHEETS AND HOOPS, NAIL RODS, AND FLAT SLIT RODS.
 BOILER PLATES—BEST, BEST BEST, AND TREBLE BEST; ALL SIZES.
 GASOMETER AND TANK PLATES; ALL SIZES.
 SHIP, BRIDGE, GIRDER, AND FLITCH PLATES; ALL SIZES.
 RIBBED AND CHEQUERED FOOT PLATES; ALL SIZES.
 CANADA AND TIN PLATES, COKE, AND CHARCOAL SHEETS, &C.
 ANGLE, EQUAL AND UNEQUAL SIDED, AND DOUBLE ANGLE.
 TEE, EQUAL AND UNEQUAL SIDED, AND DOUBLE TEE.
 SASH BARS AND TROUGH IRON OF VARIOUS SECTIONS.
 ROLLED GIRDER, JOIST, AND BEAM IRON; ALL SIZES.
 BULB, BULB ANGLE, BULB TEE, AND DECK BEAM IRON.
 FENCING AND TELEGRAPH WIRE, BLACK AND GALVANIZED.
 CONTRACTORS', PERMANENT, BRIDGE, AND TRAM RAILS.
 LOCOMOTIVE, COACH, CARRIAGE, AND WAGON TYRES.
 LOCOMOTIVE AND OTHER FIRE BARS OF VARIOUS SECTIONS.
 RAILWAY AXLES, FORGINGS, USE IRON, AND STORES OF ALL DESCRIPTIONS.
 RAILWAY SPIKES, FISH PLATES, BOLTS AND NUTS, IRONWORK OF ALL KINDS.
 RIVETS FOR SHIPBUILDING AND BEST BOILER WORK.
 BEST YORKSHIRE IRON SUPPLIED OF THE VARIOUS BRANDS.
 HOT AND COLD BLAST MELTING AND FORGE PIG IRON.
 ROLLS TURNED FOR IRREGULAR SIZES OF IRON ACCORDING TO AGREEMENT.

All Information as to Prices, &c., can be obtained at 3, BILLITER SQUARE, LONDON, or at DUDLEY.

MOORE AND MANBY,

LONDON OFFICE: BILLITER SQUARE, FENCHURCH STREET, E.C.

JOHN WARNER AND SONS,

BELL and BRASS FOUNDERS
BY SPECIAL



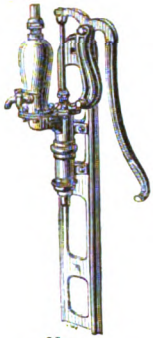
TO HER MAJESTY,
APPOINTMENT.

HYDRAULIC AND SANITARY ENGINEERS, BRAZIERS,
AND COPPERSMITHS,

The Crescent Foundry, Cripplegate, London, E.C.,

AND
R. WARNER & CO., MILLWRIGHTS & ENGINEERS,

THE FOUNDRY WORKS, WALTON-ON-THE-NAZE, ESSEX.



No. 101.
LIFT and FORCE
PUMPS, with Air
Vessels and Cocks
on Iron Planks.



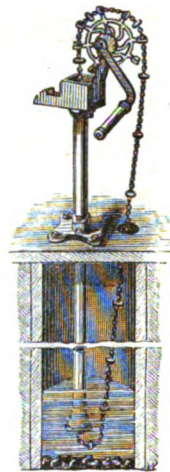
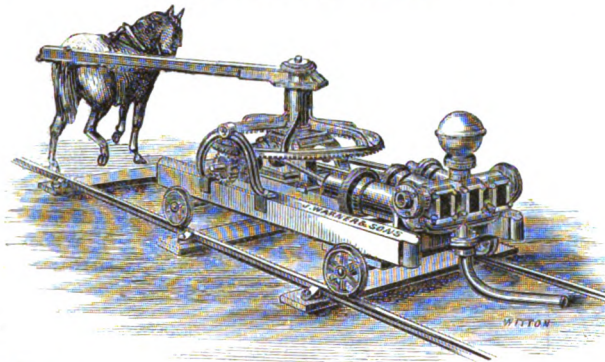
BELLS of every
description.

Warner's

Irrigation

FOR HORSE

MANUFACTURERS OF HYDRAULIC MACHINERY OF EVERY DESCRIPTION, WIND
ENGINES, FIRE ENGINES, GARDEN ENGINES, WATER WHEELS, RAMS, DEEP-WELL
PUMPS, CENTRIFUGAL PUMPS, HORSE GEAR FRAMES, ENGINE FRAMES, ETC.;
COCKS AND VALVES FOR WATER AT HIGH OR LOW PRESSURE, PLUMBERS' COCKS
AND FITTINGS, CLOSETS, BATHS, LAVATORIES, STEAM VALVES AND ENGINE
FITTINGS, GAS FITTINGS, BEER ENGINES AND FITTINGS, BELLS, TEA URNS,
AND GENERAL BRAZIERY.

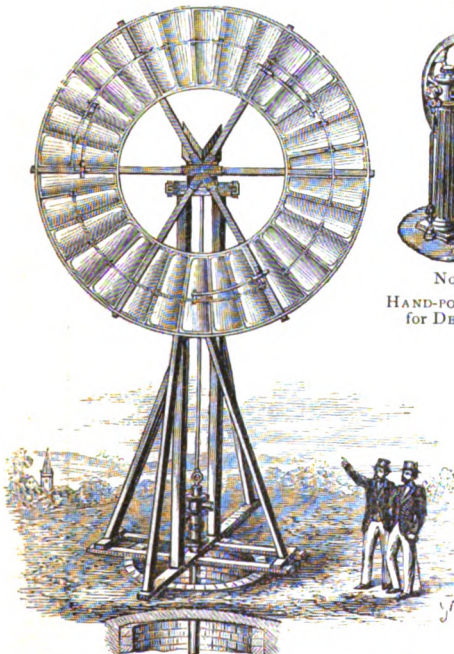


No. 14.
CHAIN PUMPS.

Portable

Pumps,

OR CATTLE POWER.



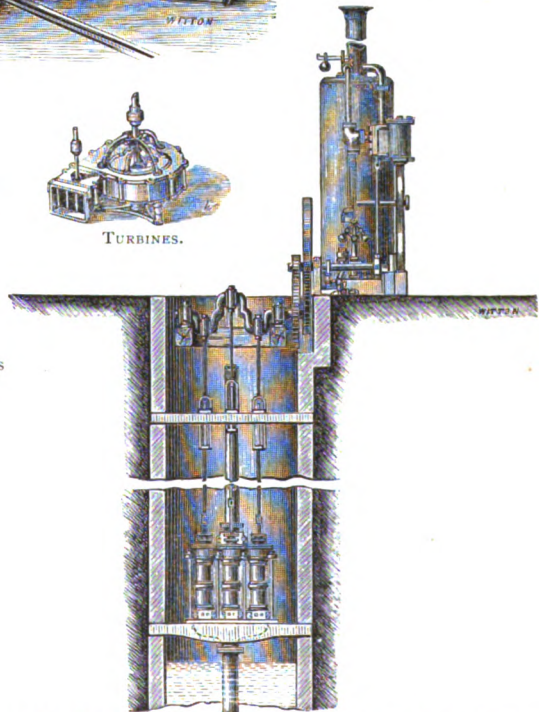
WINDMILLS for Pumping, Drainage, or Irrigation.
Nothing better in favourable positions.



No. 23
HAND-POWER FRAMES
for DEEP WELLS.



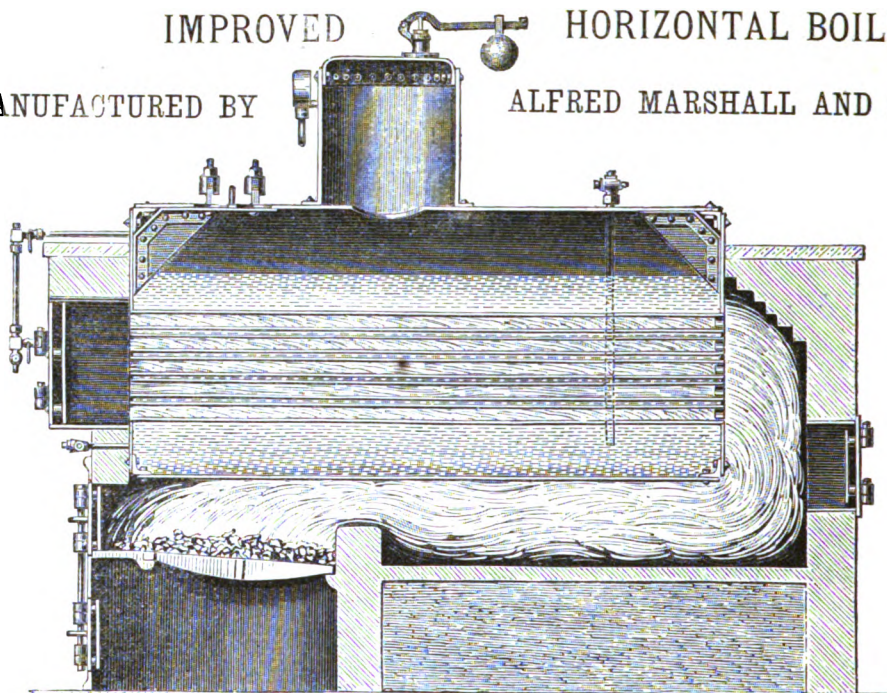
TURBINES.



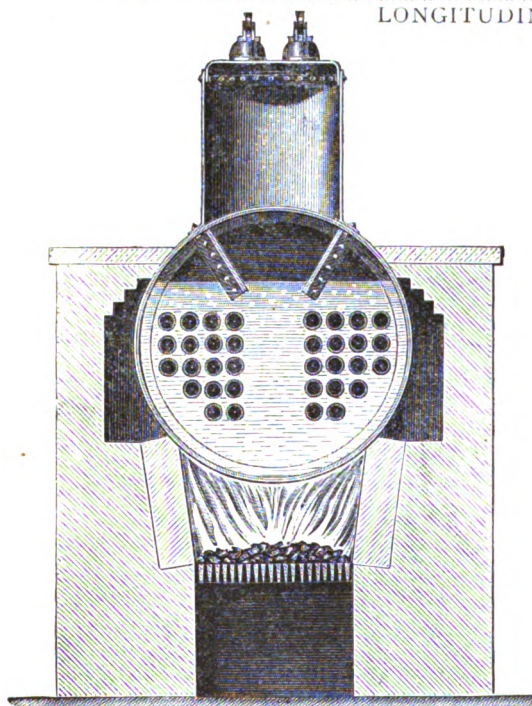
STEAM ENGINES and PUMPS for WELLS, VERTICAL STEAM ENGINES
and BOILERS, for Farm and other Mill purposes.

JOHN WARNER AND SONS,
THE CRESCENT FOUNDRY, CRIPPLEGATE, LONDON, E.C.

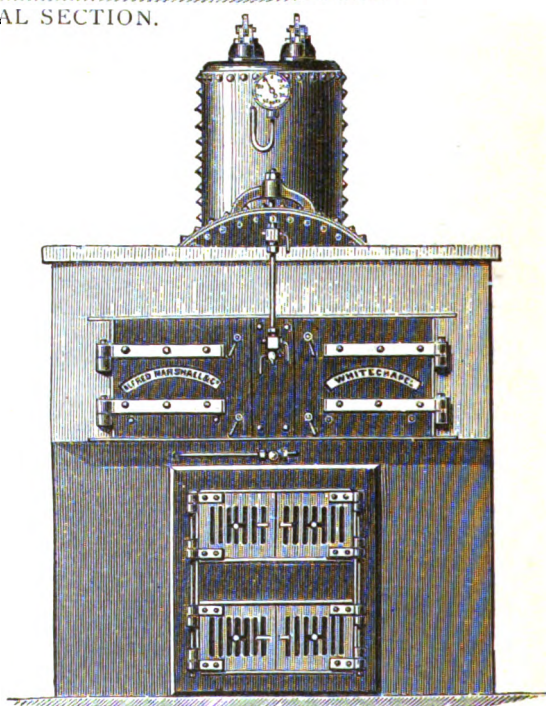
IMPROVED HORIZONTAL BOILERS.
MANUFACTURED BY ALFRED MARSHALL AND CO.



LONGITUDINAL SECTION.



CROSS SECTION.



FRONT ELEVATION.

ALFRED MARSHALL AND CO.,
ENGINEERS, BOILER MAKERS, AND MANUFACTURERS OF CAST IRON AND SMITHS' WORK,
STEAM BOILER WORKS, AND PERSEVERANCE IRON-WORKS,
HENEAGE STREET, BRICK LANE, WHITECHAPEL, LONDON, E.

IMPROVED HORIZONTAL BOILERS,

MANUFACTURED BY

ALFRED MARSHALL AND CO.

The rapid increase in our Manufacture of Vertical Multitubular Boilers has induced us to provide one of horizontal form. The particulars given are formed on an experience of some twelve years past, and are fully corroborated by all those who have them in use. The leading features are Great Power, Economy of Space, Economy in Fuel, Simplicity of Construction, and Durability in use.

For burning wood or any other kind of bulky material, coal, coke, or trade refuse, they are equally valuable. They occupy about three-fourths of the space of Cornish Boilers, with an advantage of 40 per cent. in the evaporating power. From the cross section it will be seen that three-fourths of the exterior surface is exposed to the flames, thus all the heat is necessarily utilized before passing to the chimney.

Every part of the interior can be readily and easily cleaned by a man or boy, while the exterior for the sweeping of tubes and flues from soot is equally accessible; the latter operation can be done while the boiler is working, if desired.

The objection of many people to Multitubular Boilers, because the tubes pass through the steam, is also met by the total immersion of these tubes in water. The grate surface is so small (one-half of that in Cornish Boilers) that much fuel is necessarily saved by that alone.

In case of repairs all the working parts can be readily got at, and one tube could be taken out of the group without disturbing any of the others. They are very compact for exporting, and well adapted for use abroad, as they require very little brickwork and small chimneys.

These combined advantages enable us to recommend them for general use, especially above 8 horse-power (for less than that we recommend our Improved Vertical Boilers). Every Boiler is made without stays, and fully tested by hydraulic pressure before leaving our Works; the strength of the plates employed being sufficient to stand the pressure guaranteed.

N.B.—Boilers can be made to fit any available space; particulars on application to the Manufacturers.

Patent Smoke-Consuming Apparatus, Patent Boiler Preparation, &c.

HEATING BY STEAM AND WATER ON THE MOST APPROVED PRINCIPLES.

EVERY DESCRIPTION OF BOILER (NEW AND SECOND HAND) ON SALE OR HIRE.

*** Special workmen are kept for Repairing Boilers of all kinds, under personal superintendence.*

BOILERS CLEANED OUT AND TESTED BY CONTRACT.

ALFRED MARSHALL AND CO.,

ENGINEERS, BOILER MAKERS, AND MANUFACTURERS OF CAST IRON AND SMITHS' WORK,

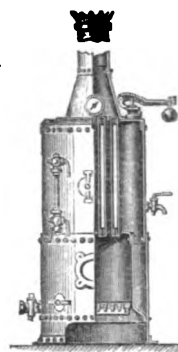
STEAM BOILER WORKS, AND PERSEVERANCE IRON-WORKS,

HENEAGE STREET, BRICK LANE, WHITECHAPEL. LONDON. E.

3 R 2

IMPROVED VERTICAL BOILERS.

MANUFACTURED BY
ALFRED MARSHALL AND CO.



The great advantages afforded in these Boilers, to all employers of steam power are now established beyond doubt, their use extending most rapidly. The very large number we have already made (both for the home and export trade) assist the completeness of our manufacture, suggesting improvements only discovered by practical experience of their working.

Every part is constructed with the utmost regard to strength and durability; materials of the best kind only are used; and workmen being specially kept for this branch of our trade, leave nothing to be desired for an effective and substantial manufacture.

They are in extensive use throughout the world, our turn-out being about 500 per annum.

We desire your special attention to the following practical points in their favour:—Great economy of fuel in working; rapidity of making steam; the great ease with which the steam is controlled, as to decrease or increase (a great advantage where power is only required at intervals); and the superheating of steam in *perfect safety*. We further desire you to notice the small space they occupy; the ease with which they are conveyed from one place to another; the advantage they possess over all other Boilers in passing them through doorways, passages, windows, &c.

No brickwork is necessary for their erection (and it is well known that in Cornish or cylindrical Boilers the brickwork, setting, and chimney shaft are all extras, amounting generally to as much, and frequently more than the cost of the Boiler itself). This, therefore, is an important and special consideration to every employer of steam power.

ALFRED MARSHALL AND CO.,
ENGINEERS, BOILER MAKERS, AND MANUFACTURERS OF CAST IRON AND SMITHS' WORK,
STEAM BOILER WORKS, AND PERSEVERANCE IRON-WORKS,
HENEAGE STREET, BRICK LANE, WHITECHAPEL, LONDON, E.

MARSHALL'S IMPROVED VERTICAL BOILERS.

It is well known to thorough engineers that a constant circulation of water is the best plan to remove the accumulation of sediment. It is at once perceptible that this recommendation is fully realized in a Vertical Boiler with tubes, and that the placing of them in various directions causes a constant and quick circulation of the water, thereby *preventing* the adhesion of the sediment, and increases the rapidity with which the steam is generated. Again, we request you to notice that in case of repairs being required, they are as easily displaced as erected, every part being readily accessible for that purpose.

These combined advantages warrant us in putting them forth as the best description of Boiler for any purpose to which steam power is applied.

Every care is taken to ensure a thorough good and substantial article, which we assure by guaranteeing, and twice testing them to 150 lb. on the square inch, before leaving our Works.

THE "O. F.," OR ORDINARY FITTINGS, comprise manhole, mudhole, covers, and cross-bars, fire door and frame, bearing and fire bars, wrought-iron stand, and smoke box. (Chimneys are extra, according to length and shape required.)

THE "O. M.," OR ORDINARY MOUNTINGS, comprise water gauge and glass, steam gauge and syphon, steam cock, feed cock, blow-off cock (and spanners), safety valve and weight, all of the best make and finish.

PRICES AND TERMS will be sent on application, either for Boilers, Boilers and Mountings, or for the whole, fixed and started on the premises, in any part of the United Kingdom.

N.B.—Boilers can be made to fit any available space; particulars on application to the Manufacturers.

Patent Smoke-Consuming Apparatus, Patent Boiler Preparation, &c.

HEATING BY STEAM AND WATER ON THE MOST APPROVED PRINCIPLES.

**A STOCK OF ALL SIZE BOILERS, NEW AND SECOND HAND, IS KEPT FOR
SALE OR HIRE.**

*** Special workmen are kept for Repairing Boilers of all kinds, under personal superintendence.*

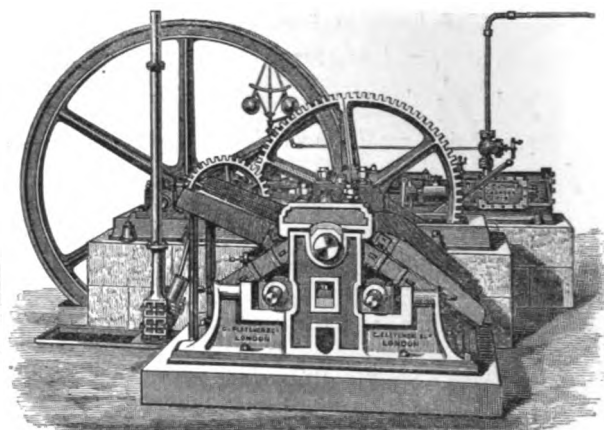
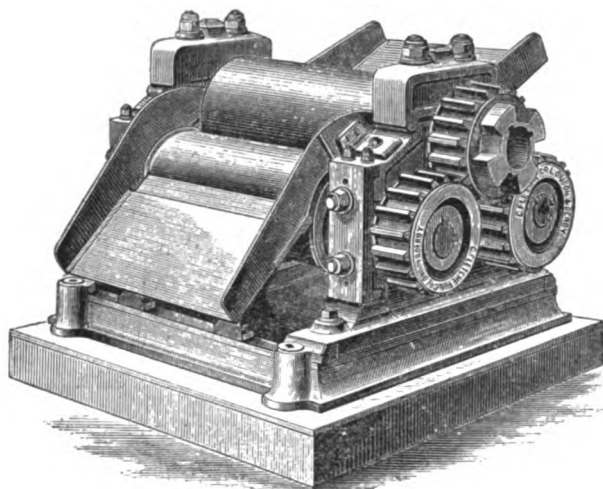
BOILERS CLEANED OUT AND TESTED BY CONTRACT.

ALFRED MARSHALL AND CO.,

ENGINEERS, BOILER MAKERS, AND MANUFACTURERS OF CAST IRON AND SMITHS' WORK.

STEAM BOILER WORKS, AND PERSEVERANCE IRON-WORKS,
HENEAGE STREET, BRICK LANE, WHITECHAPEL, LONDON, E.

GEORGE FLETCHER AND CO.,
 21, BETTS STREET, ST. GEORGE'S EAST, LONDON,
 AND
MASSON WORKS, DERBY,



Makers of all kinds of Machinery for Sugar Plantations and Refineries, Boiler Makers, General Engineers, Millwrights, Brass and Iron Founders, Coppersmiths, and original introducers to the West Indies of the Multitubular Boiler, for placing at end of Copper Wall, &c.

Amongst the articles made at our Works, we may enumerate :

Multitubular, Cornish, and other Steam Boilers of every description.
 Improved Steam Apparatus for Cleaning Tubes of Multitubular Boilers.
 Feed-Water Heaters.
 Condensing, Compound, and High-pressure Engines.
 Donkey Engines.
 Distillery Engines, with Pumps.
 Vacuum Pumps and Engines.
 Wrought-Iron Water Wheels.
 Turbines.
 Horizontal Sugar Mills, with or without our improved Standard to enable the Rollers to be taken out at side. (Horizontal Mills with Rollers to take out at side were originally made by us in 1847.) Suitable Gearing.
 Sole Makers for West Indies, &c., of WHEELDON'S Patent Chilled Pinions.
 Steam Juice Trays.
 Vertical Mills, with Gearing.
 Juice Pumps.
 Tubular and other Steam Clarifiers.
 Circular Defecators of Copper, with Iron Jacket.
 Granulating Pans of every description.
 FLETCHER AND BROCKLEHURST'S Patent Steam Pan.
 Cattle Pumps.
 Central Factories fitted complete.
 Vacuum Pans (Cast Iron or Copper) with all accessories.

Also Manufacturers of Machinery for Coffee Plantations, Collieries, Cement Works, Breweries, Chemical Works, Rice Mills, Saw Mills, Felt Works ; Iron Buildings, Bridges, Girders, &c., &c.

Plans and Estimates of foregoing furnished on application.

"Triple Effect" Apparatus, with all accessories.
 Heaters.
 Scum Presses.
 Centrifugal Sugar Machines.
 Charcoal Filters, Bag Filters, Pug Mills, &c.
 Subsiders.
 All kinds of Apparatus for re-burning Animal Charcoal.
 JOHN FLETCHER'S Patent Retorts for ditto.
 Copper Rum Stills (Steam or Fire).
 Light Rails, Axles and Wheels for Megass Wagons.
 Locomotives of the most improved description.
 Rails and Chairs, &c., for same.
 Traction Engines.
 Batteries, with Furnace Work, Dippers, and Cranes.
 Montjus or Steam Syrup Chargers (SKEKEL'S).
 Improved Feed Donkeys. (*See Special List.*)
 Cane Punts, with or without Pine bottoms.
 Draining Machinery, Scoop Wheels, &c.
 LAWRENCE AND PORTER'S Patent Centrifugal Pump (sole makers, GEORGE FLETCHER AND CO.). This Pump is superior to anything of the kind hitherto made, both for simplicity and effective power ; the cost also being less. (*See Special List.*)
 Cast and Wrought Iron Tanks.
 SKEKEL'S Patent Furnace Feeder (Iron Fireman).
 All other Machinery used on Sugar Plantations, such as Wheels, Pinions, Cranes, Crabs, Tools, &c.

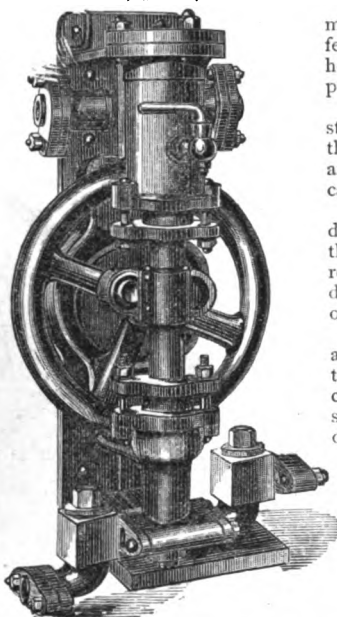
GEORGE FLETCHER AND CO.,

ENGINEERS AND BOILER MAKERS,

21, BETTS STREET, ST. GEORGE'S EAST, LONDON ; AND MASSON WORKS, DERBY.

GEORGE FLETCHER AND CO.'S SPECIAL DONKEY FEED PUMPS.

Nos. 2, 3, and 4.



The design of these Pumps is expressly made to fill a want which has long been felt for a Boiler Feeder suitable for either hot or cold water, as well as for all other purposes.

In recommending this Pump, we may state that it is of the most simple design, the working parts being few and specially arranged so as to be easily removed in case of accident or repairs.

For forcing or raising liquids of every description, these Pumps are the best in the market, and will certainly give better results, both as regards efficiency and durability, than any other now being offered to the notice of Steam users.

These Feed Donkeys are made to the annexed Engravings, and we include with them for prices quoted, grease cup and pet cocks, chased flanges for steam, exhaust, suction, and discharge, also packing and delivery for shipment in either London or

Liverpool. It will be found that our prices compare favourably with those quoted by other makers, although the strength and finish of our Pumps are vastly superior to those usually offered.

Nos. 5 and 6.



SIZE, &c.	No.	2	3	4	5	6
Diameter of Cylinder .. Inches		2½	3½	4½	4½	6
Plunger .. "		1½	2	2½	3	4
Stroke .. "		3	4	5	5	8
Gallons raised per hour .. "		115	290	480	700	1700
Horse-power of Boiler supplied ..		10	25	40	60	150
Price, Pounds sterling ..		£12 16s.	£16	£22 10s.	£30	£42 10s.

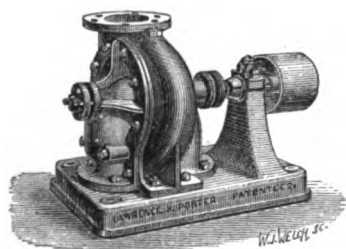
PRICES OF LARGER SIZES FURNISHED ON APPLICATION.

The quantities of water given by the various Pumps are such as they will throw when working at a moderate and steady speed, and not at their maximum. The horse-power of the Boilers is merely nominal, as the quantity of water allowed is at least double that required per effective horse-power.

LAWRENCE AND PORTER'S PATENT CENTRIFUGAL PUMPS AND PUMPING ENGINES.

SOLE MAKERS:

**GEORGE FLETCHER AND CO.,
LONDON AND DERBY.**



See 'Engineering,' May 28th and August 6th; and 'The British Trade Journal.'

SPECIALITIES—Increased Duty, Simplicity of Construction, Disc removable without disturbing Pipes, Economy of Space, Reduction of Prices.

Full Particulars on application.



PRICES OF PUMPS AND FOOT VALVES.

Diameter of Suction and Delivery Pipe in inches.	Approximate Quantity of Water in Gallons per Minute.	Pumps with One Standard and One Pulley.	Pumps with Two Standards and One Pulley.	Pumps with Two Standards and Two Pulleys.	Foot Valves and Gratings.
3	75 and upwards	£ 12 15 0	£ 14 15 0	£ 16 10 0	£ 1 12 6
4	200 "	16 0 0	18 10 0	19 5 0	2 5 0
5	300 "	21 0 0	24 5 0	25 5 0	3 3 0
6	500 "	25 0 0	29 0 0	30 0 0	4 0 0
8	800 "	34 0 0	39 0 0	41 0 0	5 10 0

PRICES FOR LARGER SIZES ON APPLICATION.

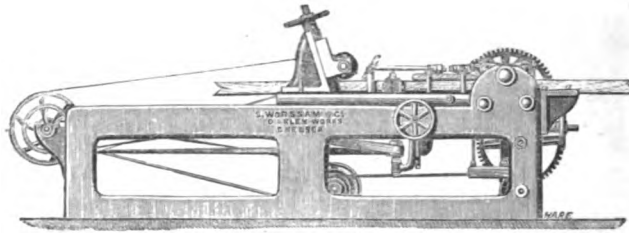
SOLE MANUFACTURERS OF THE PATENT GENERAL JOINER.

PRIZE MEDAL, LONDON, 1862.

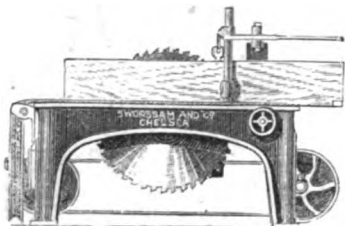
PRIZE MEDAL, VIENNA, 1873.

SILVER MEDAL, PARIS, 1867.

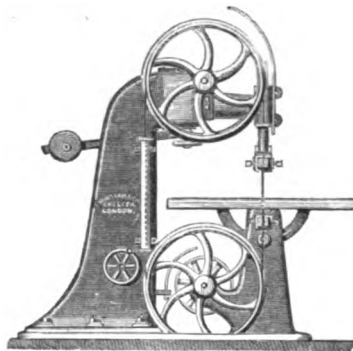
This Machine will
Plane, Groove, Tongue
Edge, Thickness, and
Bead Match-Boarding
or Flooring, Cut Single



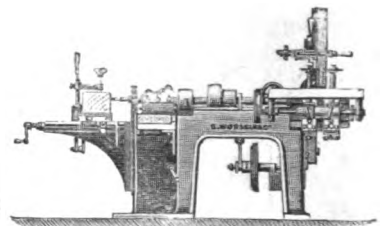
or Double Mouldings,
in hard or soft wood,
at rates varying from
12 feet to 30 feet per
minute.

IMPROVED MOULDING AND PLANING MACHINE.**IMPROVED SELF-ACTING SAW BENCH.**

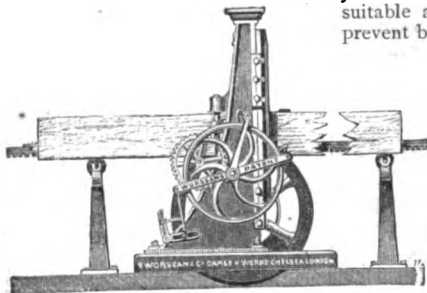
This Bench is adapted for Cutting Logs, Planks, Deals, Battens, &c., and is provided with an improved Self-acting Rope-feed Motion for advancing the Timber to the Saw. The feed may be varied from 15 feet to 60 feet per minute. When cutting long stuff, carriages running on rails are used to support the overhanging ends.

**BAND-SAW MACHINE.**

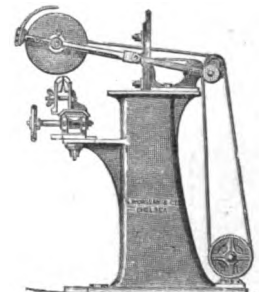
This Machine is particularly applicable to the general purposes of Builders and Contractors, Railway Carriage Builders, Wheelwrights and Coopers, &c., &c. The table is adjustable to various angles, and a suitable arrangement is provided to prevent breakage of Saws.

**THE PATENT GENERAL JOINER.**

This Machine has been specially invented to meet the requirements of Joiners, Builders, Contractors, Cabinet Makers, and Pianoforte Manufacturers. Tenons are completed at one operation. Mouldings are worked by Self-acting Feed. It will plane stuff up to 9 in. by 3 in. Mortises are chased and the ends squared out. Irregular Work and Curved Mouldings can be formed almost to any pattern. All the operations may be carried on separately or simultaneously, without altering any part of the Machine.

**PORTABLE DOUBLE DEAL FRAME.**

This Machine is adapted to the purposes of Builders and Contractors. It is self contained, and costly foundations are not required. It will saw two Deals at a time. It is provided with a Back-feed Motion, actuated by Worssam's Patent Silent Feed.

**PERIN'S FRENCH BAND SAWS.****IMPROVED SAW SHARPENER.**

The object of this Machine is to lessen the cost of Saw Sharpening. The File is almost dispensed with. It will sharpen either Circular or Frame Saws.

For particulars of every description of Wood-Working Machinery apply to SAMUEL WORSSAM & Co., Contractors to the British, Indian, French, Russian, Turkish, Spanish, and Swedish Governments; also to the Government of the Dutch East Indian Colonies; and the principal Railway Companies of Great Britain, &c., &c.

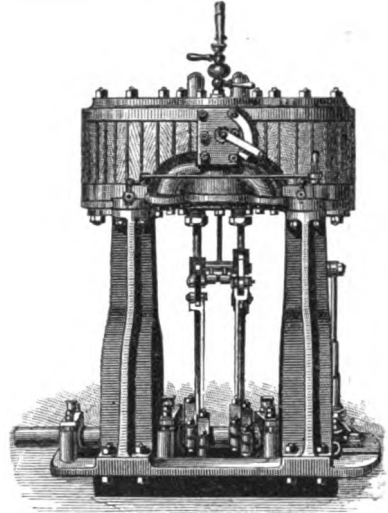
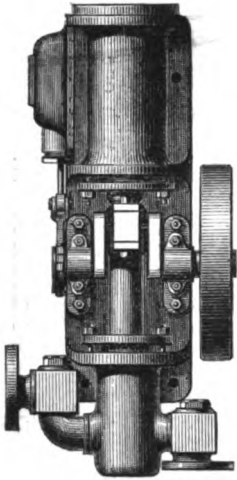
New Illustrated Catalogues of Patent Machinery for Builders and Joiners sent on application.

SAMUEL WORSSAM AND CO.,
OAKLEY WORKS, KING'S ROAD, CHELSEA, LONDON, S.W.

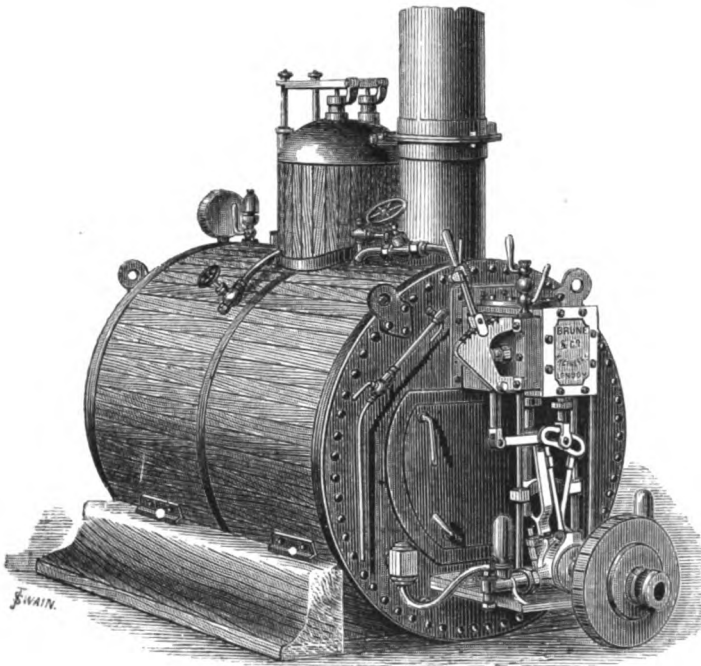
ENGINES, BOILERS, AND PUMPS.

CONTRACTORS TO THE ADMIRALTY.

**YACHT,
TUG, LAUNCH,
AND
BOAT BUILDERS.**



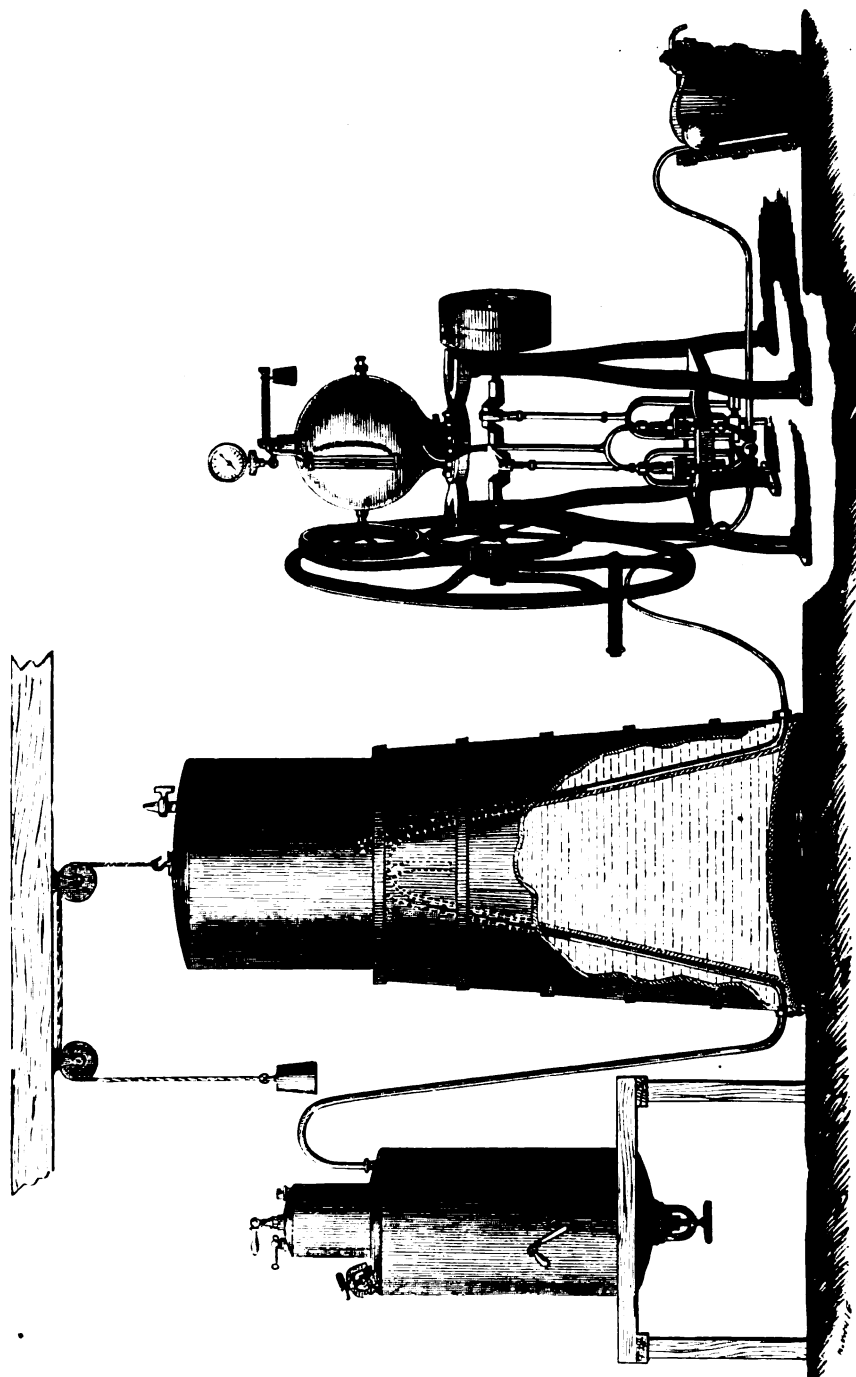
ENGINES OF ALL DESCRIPTIONS KEPT IN STOCK.



SOLE MAKERS OF THE CELEBRATED EDEN DONKEY-PUMP.

BRUNE AND CO.,
ENGINEERS, EDEN WORKS, EDEN STREET, HAMPSTEAD ROAD, LONDON, N.W.

CONTINUOUS SODA-WATER APPARATUS.



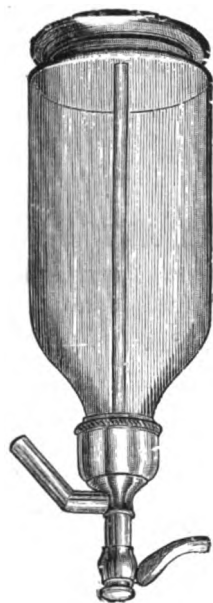
The above Engraving represents one of E. G. and Co.'s Continuous Soda-Water Apparatus, with one or two Pumps (for making all kinds of Effervescing Drinks), and can produce from 4000 to 12,000 bottles per day.

ILLUSTRATED CATALOGUE ON APPLICATION.

E. GERAUT AND CO.,

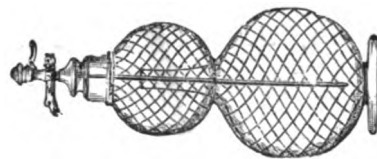
MANUFACTURERS OF ALL KINDS OF MACHINERY, ON THE MOST IMPROVED PRINCIPLE, FOR MINERAL-WATER MANUFACTURERS,

1, CORPORATION BUILDINGS, FARRINGTON ROAD, LONDON, E.C.



E. GERAUT AND CO.'S PATENT SYPHON.

These we make, of various sizes, of thick, strong glass, and guarantee the mountings to be exclusively of the best English Block Tin, and can say with confidence that for finish, perfection of workmanship and elegance, there has nothing like it yet been introduced in the United Kingdom.



E. GERAUT AND CO.'S

PATENT LEVER SELTZOGENES,

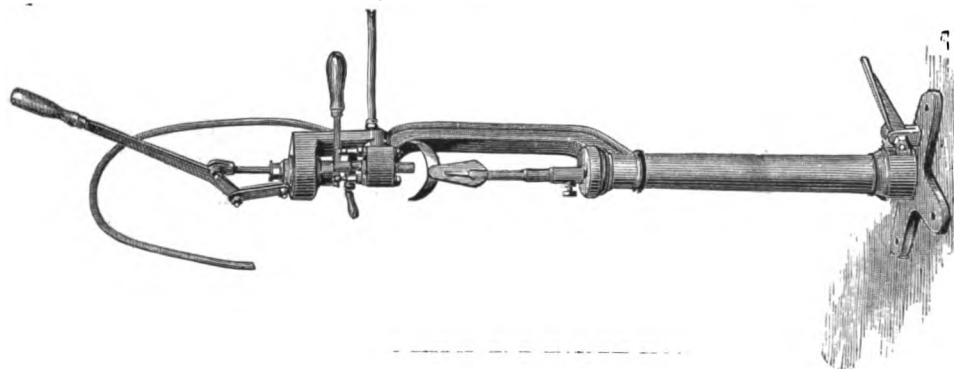
FOR THE PREPARATION OF

DELICIOUS SUMMER DRINKS,

SUCH AS

Aërated Water, Lemonade, Soda Water, Seltzer Water, Eau de Vichy, &c., at the trifling cost of 3s. to obtain 50 pints of Aërated Drinks.

CATALOGUES ON APPLICATION.



E. GERAUT AND CO.,

SOLE MANUFACTURERS IN THE UNITED KINGDOM OF THE PATENT IMPROVED SELTZOGENES, SYRUP, &c.,

1, CORPORATION BUILDINGS, FARRINGTON ROAD, LONDON, E.C.

3 S 2

THIS IS A NEW PATENT BOTTLING AND CORKING AND SELF-ACTING SYRUP DOSING MACHINE for Filling, Corking, and Syruping at the same time ordinary bottles, and has two great advantages for Mineral Water Makers, in saving labour, and great economy in syrup.

E. GERAUT AND CO.'S NEW PATENT

FILLING AND SELF-ACTING SYRUP DOSING MACHINE,

Both combined together, for Filling and Syruping Syphons at the same time—a result hitherto unaccomplished.

DAVID L. SELKIRK,
CONSULTING ENGINEER, STEAMSHIP SURVEYOR,
 AND AGENT FOR THE SALE AND PURCHASE OF
STEAM AND SAILING VESSELS, MACHINERY, FURNISHING
STORES, PAINTS, &c.,
9, LONDON STREET, LONDON, E.C.

AGENT FOR

WM. SIMONS AND CO.,
 SHIPBUILDERS, ENGINEERS, AND IRON-
 FOUNDERS,
 RENFREW, N. B.

BOW McLAHLAN AND CO.,
 PATENT STEAM STEERING APPARATUS,
 ENGINEERS AND FOUNDERS,
 PAISLEY, N. B.

SPÉCIALITÉS.

EDGE TOOLS, SAWS, AND GENERAL IRONMONGERY.

GENERAL HARDWARE, AND SHIPS' BRASS FOUNDRY.

BOLTS, NUTS, AND RIVETS.
 BRASS AND IRON TAPS AND VALVES.
 BOILER MOUNTINGS (Brass and Iron).
 BOAZ'S PATENT TUBE STOPPERS.
 CEMENT FOR STEAM JOINTS.
 FURNACE BARS.
 HAIR FELT FOR BOILERS.
 INJECTORS AND EJECTORS.
 INDICATORS FOR STEAM ENGINES.
 IRON, BRASS, AND COPPER BOILER TUBES.

BROUGH'S PATENT GOVERNORS.
 INDIARUBBER SHEETS.
 „ VALVES AND WASHERS.
 PRESSURE AND VACUUM GAUGES.
 PORTABLE RAILWAY AND WHARF CRANES.
 PULLEY BLOCKS OF ALL KINDS.
 PATENT TUBE EXPANDERS.
 PORTABLE ENGINES AND ENGINEERS' TOOLS.
 WATER HEATERS.
 WHITES' ANTI-CORROSIVE FLUID FOR BOILERS.

Castings, with Estimates, for all kinds of Machinery, accompanied with Drawings.

DAVID L. SELKIRK,
 CONSULTING ENGINEER, 9, LONDON STREET, LONDON, E.C.

W. SIMONS AND CO.,
ENGINEERS, SHIPBUILDERS, AND FOUNDERS,
MANUFACTURERS OF
IRON STEAMERS, COMPOSITE VESSELS, DREDGERS,
ENGINES, AND BOILERS.

DREDGING.

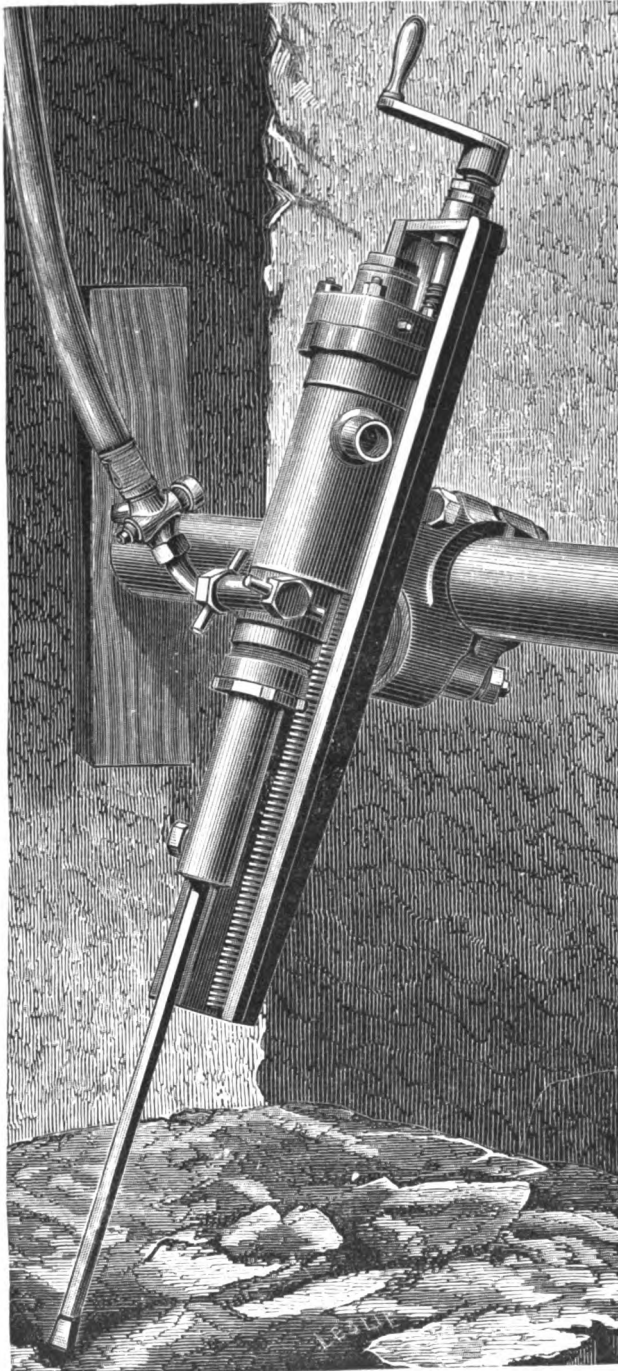
We solicit the attention of Engineers, Contractors, and Corporations to our NEW PATENT DREDGE PLANT, by which Harbours, Docks, Bars, Rivers, Channels, Shoals, and Ship Canals can be deepened or cut from 1 foot to 40 feet in any soil, with great speed and economy. The Dredge Plant has been already supplied to the Clyde Trust; the Government Works at Carlisle; the North Sea Ship Canal, Holland; the India Government; the Crown Agent for the Colonies; the Cardiff Docks; the Canadian Government; the Egyptian Government; the Australian Government; the North-Eastern Railway Co.; Caledonian Railway Co.; the Harbours of Stockton, Bristol, Newcastle, Greenock, Barrow, Hartlepool, Dundee, Swansea, Fleetwood, Aberdeen, Liverpool, and elsewhere. It is particularly adapted for exposed localities, and can steam to any part of the world.

LONDON WORKS,
RENFREW, NEAR GLASGOW.

LONDON OFFICE:
9, LONDON STREET, E.C.

D. L. SELKIRK, Agent.

ROCK-BORING MACHINERY.



THE DARLINGTON VALVELESS ROCK-BORER.

Only ONE MOVING PART to obtain the
BLOW.

Length of Stroke One to Four Inches.

SPECIALLY SUITABLE FOR

**RAILWAY TUNNELS, MINES,
QUARRIES,**

AND OTHER WORK.

SHORT, LIGHT, QUICK IN SPEED, AND
DURABLE.

IN USE IN

GREAT BRITAIN, FRANCE, PRUSSIA,
SPAIN, AFRICA, AND ELSEWHERE.

**STRETCHER BARS, BORER CARRIAGES,
AIR RECEIVERS,**

DRY AND WET AIR COMPRESSORS,

AIR TUBING,

ELECTRIC BLASTING APPARATUS,

DETONATORS, FUSES,

BLASTING STICKS, BORING STEEL,
AND FLEXIBLE TUBING;

ALSO

**Automatic, Steam, and Hydraulic
Pumps,**

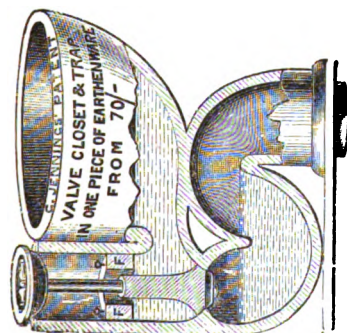
ORE DRESSING, AND ALL KINDS
OF MINING MACHINERY

FOR PARTICULARS, APPLY TO

A. ALLEN,

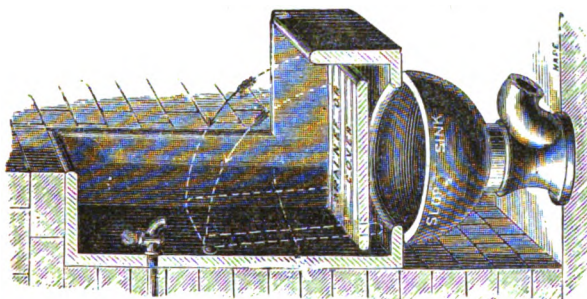
PHENIX METAL-WORKS, CLARENDON GROVE, DRUMMOND STREET,
EUSTON, LONDON.

SANITARY AND BUILDING APPLIANCES.



JENNINGS' Valve Closet and Trap in One Piece of Earthenware is most simple and efficient for all first-class works, from 70s. and upwards.

JENNINGS' Improved House Slop Sink, Trapped, in Plain or Enamelled Slate; made to suit any position. From £4 4s. upwards.



JENNINGS' PATENT SHOP SHUTTER-SHOE and FASTENER, shoe and secure Shutters without a Bar. Reference to Eight Thousand Shop Fronts.

JENNINGS' PATENT TIP-UP LAVATORIES. These Lavatories are to be found in nearly every Club, Hotel, Bank, Asylum, Union, and other Public Buildings in London and the Provinces, and can be made to any dimensions or design. They are to be preferred to basins discharged through a plug-hole, as they leave no filthy deposit on the interior of the basin, and the loss of brass plugs, and the breaking of chains are altogether avoided.

JENNINGS' PATENT LIPPED URINALS, for works of every class. As these are so generally known and appreciated, it is only necessary to remind architects when drawing their Specifications, to state "Jennings' Patent Flat Back," or "Angular Lipped Urinals."

JENNINGS' PATENT AIR BRICKS can be had of any size, from 9 in. by 3 in. to 18 in. by 18 in., and of any shade of colour, from light-cream up to a dark-brown, glazed or unglazed. These Bricks are not only cheaper than iron, but they are stronger, and require no painting.

JENNINGS' PATENT PUMPS, Sluice Valves, Fire and other Cocks, Improved Gas and Water Pipes, BY THE USE OF WHICH A LENGTH OF GAS OR WATER PIPE CAN BE REMOVED FROM ANY FITTINGS WITHOUT TROUBLE. These and many other things can be seen at the Works.

Price complete,
63s. per basin
in Plain Slate.
84s. in Enamel-
led Slate of any
colour.
126s. in Marble.

JENNINGS' PATENT AIR-CHAMBER SMOKE FLUES.—By the use of these Flues, the Warming and Ventilation of Buildings is ensured with economy of fuel, as no heat can pass up the chimney wastefully without passing the Temperature of the Air-supply of the rooms in which they are employed.

JENNINGS' IMPROVED PATENT BONDING BRICK FOR THE CONSTRUCTION OF HOLLOW WALLS.—Walls so constructed render houses warm in winter, cool in summer, and dry at all times. These improved Patent Bond-Bricks are well worthy the attention of architects, as by their use underground works are strengthened and rendered perfectly dry; they also keep the faces of area and other retaining walls free from the influence of the moist ground abutting upon them.

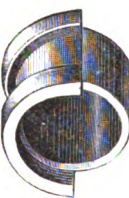


FIG. 7.

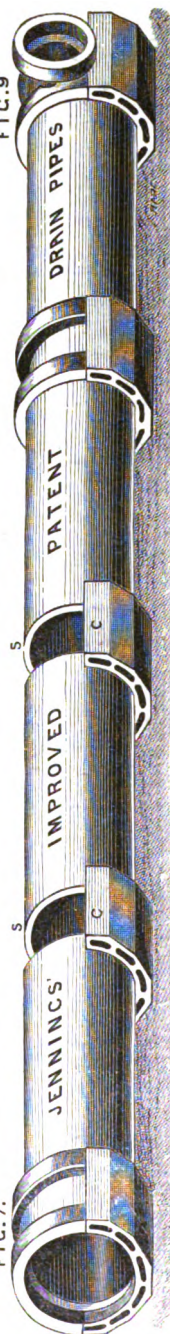


FIG. 9.

JENNINGS' IMPROVED PATENT DRAIN PIPES.

Invert Blocks, Telescopic Drain Pipe Connectors, Lovegrove's Patent Gully Traps, and Mansergh's Patent Ventilating Traps for Sinks, &c.

THESE PATENT PIPES ARE SOLD AT THE SAME PRICE AS THE COMMON SOCKET PIPES.

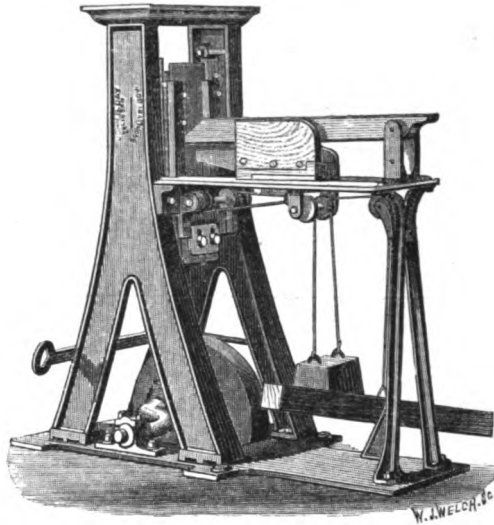


JOSEPH B. DAY, ENGINEER AND MACHINIST.

MAKER OF SPLINT-CUTTING MACHINERY,

IMPROVED VERTICAL
FLAKING MACHINE,

PRICE, £36.



FOR
CUTTING COARSE-
GRAINED WOODS.

WILL CUT
650 BUNDLES OF
SPLINTS PER DAY.

AND ALL KINDS OF

TOOLS AND MACHINERY

USED IN THE MANUFACTURE OF

LUCIFER MATCHES, MATCH BOXES, VESUVIANS,
WAX TAPERS, &c.

IMPROVED CROSS-CUTTING AND HOOP-PUNCHING MACHINES, &c.,
FOR PACKING-CASE MAKERS.

JOSEPH B. DAY,
119, ST. LEONARDS STREET BROMLEY-BY-BOW.

FRASER BROTHERS,
BROMLEY-BY-BOW, LONDON, E.,
AND
98, COMMERCIAL ROAD EAST,
MANUFACTURERS OF EVERY DESCRIPTION
OF
LANCASHIRE AND CORNISH STEAM BOILERS,
SPECIAL COMPOUND STEAM BOILERS,
MARINE AND LOCOMOTIVE BOILERS,
VERTICAL STEAM BOILERS,
STEAM-LAUNCH BOILERS,
FEED-WATER HEATERS AND CONDENSERS,
GIRDERS, BRIDGES, AND ROOFS,
CABLE-TANKS, BUOYS, &c., for Telegraph Construction.

For Particulars and Prices apply at the Works,

BROMLEY-BY-BOW.

IRON TANKS FOR STORING WATER, OIL, VARNISH, &c.

COOKING APPARATUS

FOR CLUBS, HOSPITALS, WORKHOUSES, PUBLIC BUILDINGS, STEAM AND SAILING
VESSELS, &c.

HEATING AND VENTILATING APPARATUS,

WASHING AND DRYING APPARATUS,

DISINFECTING APPARATUS (PATENT).

STEAM FITTINGS AND APPARATUS OF EVERY DESCRIPTION FOR MANUFACTURING PURPOSES.

For Particulars and Prices apply at the Works,

98, COMMERCIAL ROAD EAST.

CORNISH STEAM BOILERS.

(SEE PAGE 510.)

H.-P.	Diam.	Length.	Diameter of Furnace.	Casing.	Flue.	Ends.	Steam Chest.	APPROXIMATE WEIGHT OF BOILER AND FURNACE.	APPROXIMATE PRICE.			
									BOILER AND FURNACE.		STEAM FITTINGS.	
	ft. in.	ft.	in.	in.	in.	in.	in. in.	tons. cwt. qrs. lb.	£	s. d.	£	s. d.
4	4 0	8	24	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	24 X 21	1 15 0 0	55	0 0	11	0 0
6	4 3	10	26	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	24 " 21	2 3 0 0	68	0 0	12	0 0
8	4 3	12	26	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	26 " 22	2 16 2 0	87	10 0	12	15 0
10	4 6	14	28	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	26 " 22	3 6 2 0	100	0 0	13	15 0
12	4 9	15	29	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	27 " 24	3 15 0 0	110	0 0	14	17 6
14	5 0	16	30	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	27 " 24	4 1 0 0	122	10 0	16	0 0
16	5 0	17	30	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	30 " 24	4 6 0 0	127	10 0	17	10 0
18	5 2	20	33	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	30 " 24	5 5 0 0	147	10 0	18	15 0
20	5 6	20	34	$\frac{1}{8}$ full	$\frac{1}{8}$	$\frac{1}{8}$	30 " 27	6 0 0 0	160	0 0	19	10 0
25	5 6	25	34	$\frac{1}{8}$ "	$\frac{1}{8}$	$\frac{1}{8}$	30 " 30	7 4 2 0	185	0 0	21	10 0

LANCASHIRE STEAM BOILERS.

(SEE PAGE 508.)

H.-P.	Diam.	Length.	Furnace Tubes.	Casing.	Flue.	Ends.		APPROXIMATE WEIGHT OF BOILER AND FURNACE.	APPROXIMATE PRICE.			
									BOILER AND FURNACE.		STEAM FITTINGS.	
	ft. in.	ft.	in.	in.	in.	in.		tons. cwt. qrs. lb.	£	s. d.	£	s. d.
30	6 3	20	Two 28	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	With 4 Circulating Tubes.	8 10 0 0	250	0 0	27	0 0
40	7 0	24	" 33	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	" 8	11 5 0 0	320	0 0	29	0 0
50	7 6	27	" 36	$\frac{1}{8}$ bare	$\frac{1}{8}$	$\frac{1}{8}$	" 10	14 15 0 0	385	0 0	32	0 0
60	7 8	30	" 38	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	" 12	16 0 0 0	440	0 0	35	0 0

FRASER'S SPECIAL COMPOUND BOILERS.

(SEE PAGE 509.)

H.-P.	Diam.	Length.	Furnace.	APPROXIMATE WEIGHT OF BOILER AND FURNACE.	APPROXIMATE PRICE.			
					BOILER AND FURNACE.		STEAM FITTINGS.	
	ft. in.	ft. in.	in.	tons. cwt. qrs. lb.	£	s. d.	£	s. d.
20	5 9	15 0	Two 25 $\frac{1}{2}$	6 0 0 0	210	0 0	25	0 0
30	6 3	16 6	" 28	7 10 0 0	250	0 0	27	0 0
40	6 9	18 0	" 30	9 15 0 0	320	0 0	29	0 0
50	7 3	21 0	" 34	11 10 0 0	380	0 0	32	0 0
60	7 6	23 0	" 36	13 10 0 0	430	0 0	35	0 0

Substance of Plates same as in Lancashire Boilers.

N.B.—We draw particular attention to the above Compound Boilers. They are designed with extra and more efficient heating surface with the special view of Economy in Fuel.

FRASER BROTHERS,

BROMLEY-BY-BOW, LONDON, E.

VERTICAL STEAM BOILERS.

(SEE PAGES 511 and 512.)

Prices vary from £8 to £12 per Horse-power, according to Design and Requirements.

All our Boilers are constructed of Best Staffordshire Plates (*of first-class brands*), with "Lowmoor" or "Bowling" over Furnaces, and so arranged that rivets and laps are below the fire bars. They are most carefully made, and designed to stand a working Steam pressure of 50 lb. per square inch, and tested by Hydraulic pressure to 100 lb. per square inch before leaving our Works. (Certificate given.)

For higher pressures we recommend stiffening belts, or flanged and welded joints to tubes, planed edges to plates, double riveted casings, and the holes in plates drilled instead of punched.

Conical circulating tubes of "Lowmoor" iron are recommended in furnace tubes of Lancashire and Cornish Boilers of above 12 horse-power.

The steam fittings and mountings consist of Two Water Gauges, or Water Gauge and Gauge Cocks, Pair of Lever Safety Valves, with graduated levers and weights, Blow-off Cock, Injection Valve, Bourdon's Dial Pressure-Gauge, Damper and frame, Chequered front foot plate and frame, and two special soot doors and frames.

Special brick seating blocks are kept in stock for all sized Steam Boilers, and can be supplied on receipt of order.

Fusible Plugs fitted to crowns of furnaces if desired.

Anti-Priming Pipes are fitted, instead of Steam Chests, if preferred, without additional charge.

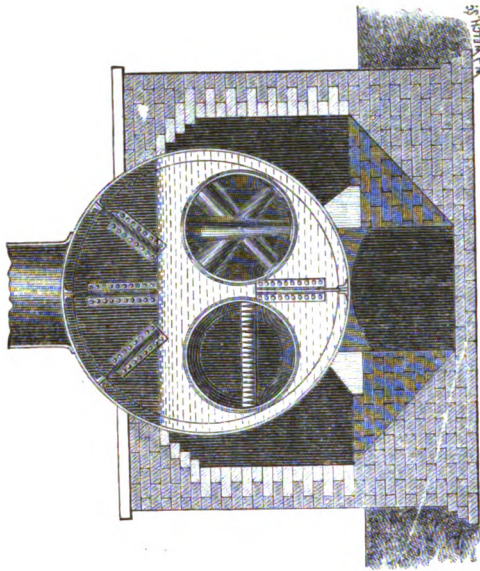
The whole of the Machinery employed in the manufacture of Steam Boilers at these Works is of the most modern design, which enables us to construct this class of work in the best manner and finish.

FRASER BROTHERS,

BROMLEY-BY-BOW, LONDON, E.

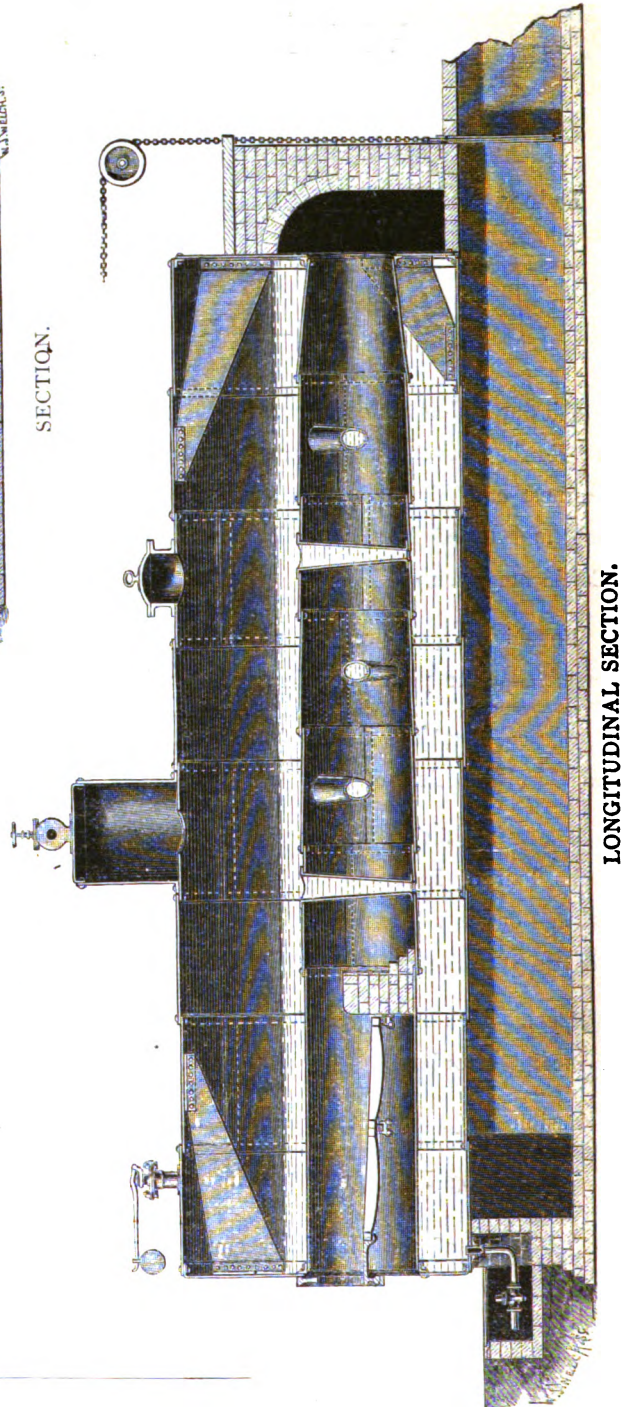
3 T 2

LANCASHIRE STEAM BOILER.



ELEVATION.

SECTION.

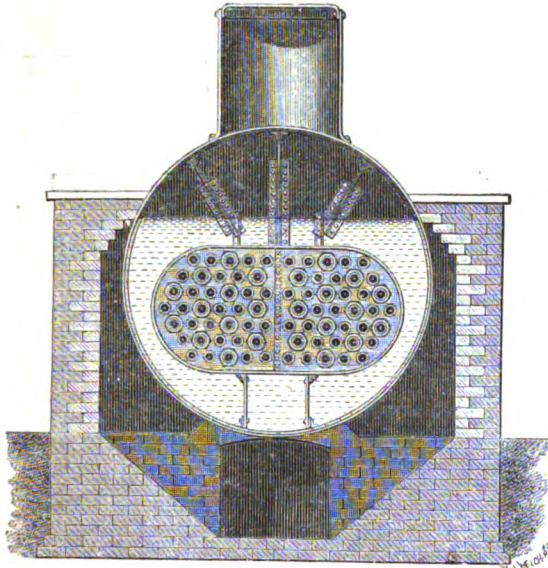


LONGITUDINAL SECTION.

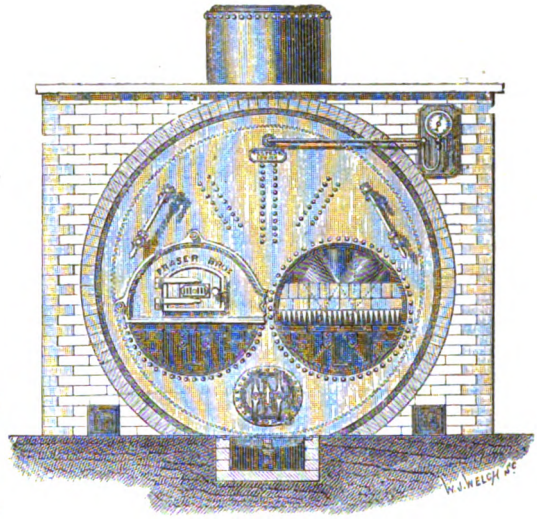
SEE PAGE 506, OR FOR FULL PARTICULARS, TO
FRASER BROTHERS,
 BROMLEY-BY-BOW, LONDON, E.

FRASER'S SPECIAL COMPOUND BOILER.

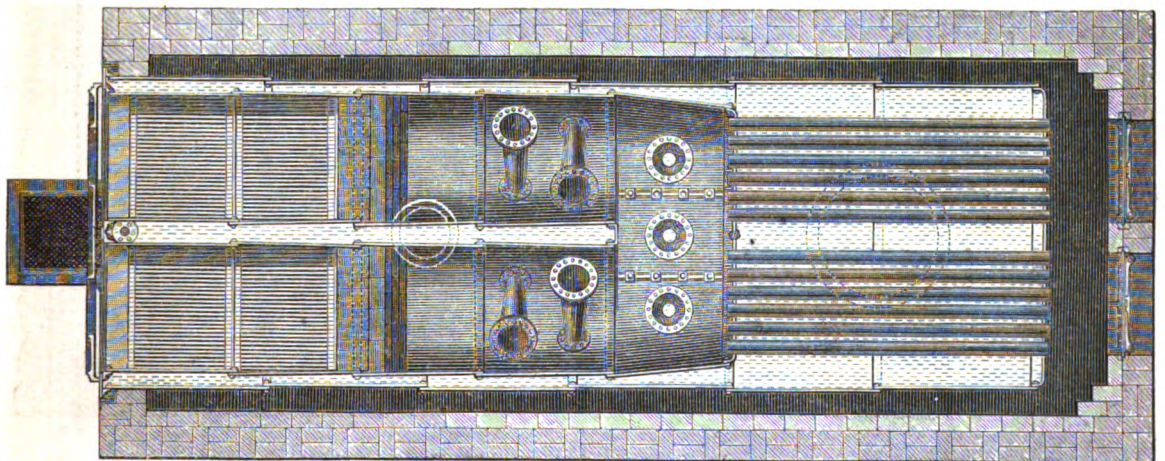
STRONGLY RECOMMENDED FOR ECONOMY OF FUEL.



SECTION.



ELEVATION.



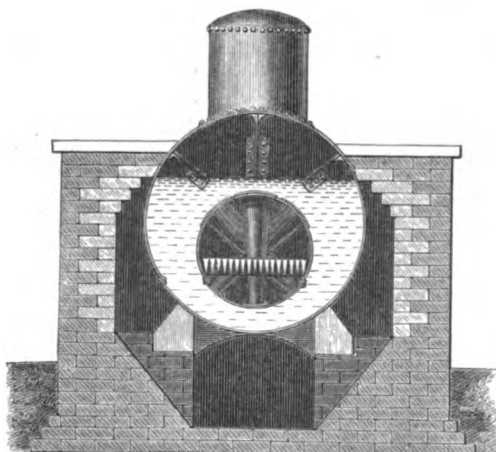
SECTIONAL PLAN.

SEE PAGE 506, OR FOR FULL PARTICULARS, TO

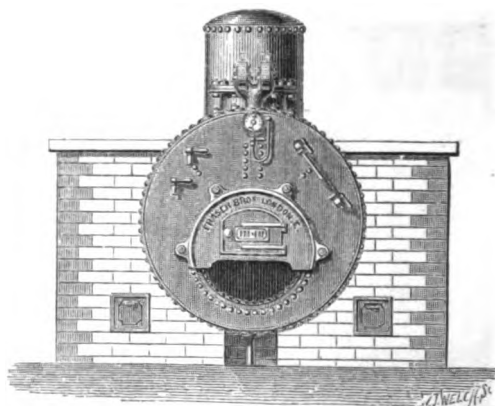
FRASER BROTHERS,

BROMLEY-BY-BOW, LONDON, E.

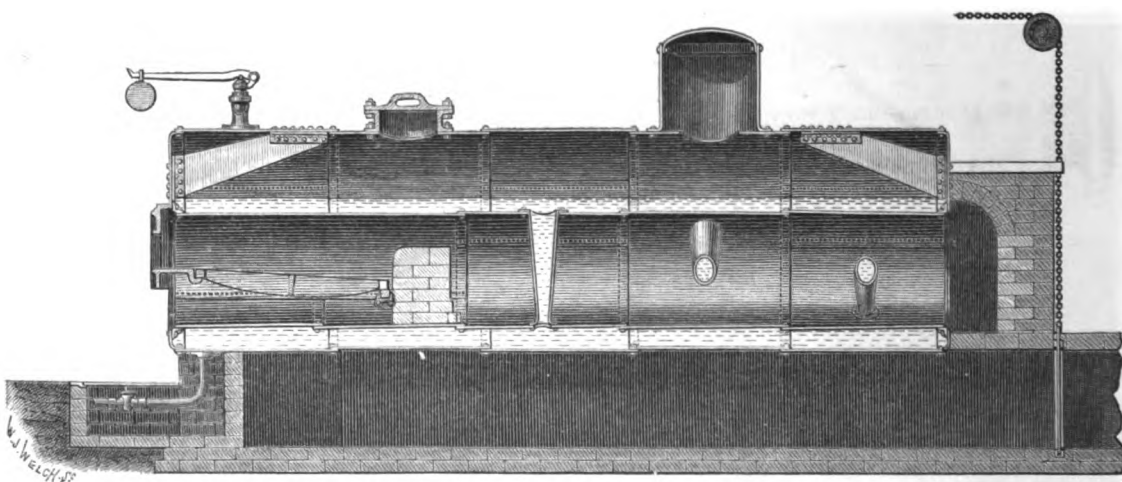
CORNISH STEAM BOILER.



SECTION.



ELEVATION.

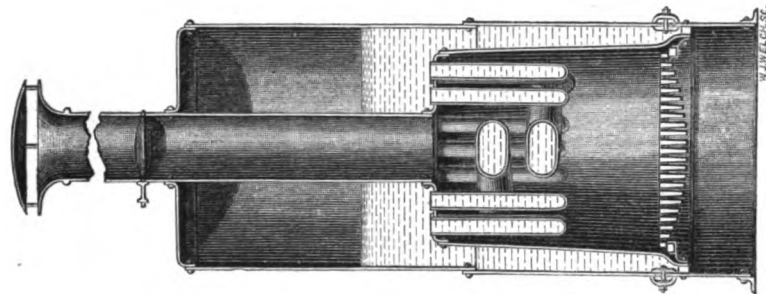


LONGITUDINAL SECTION.

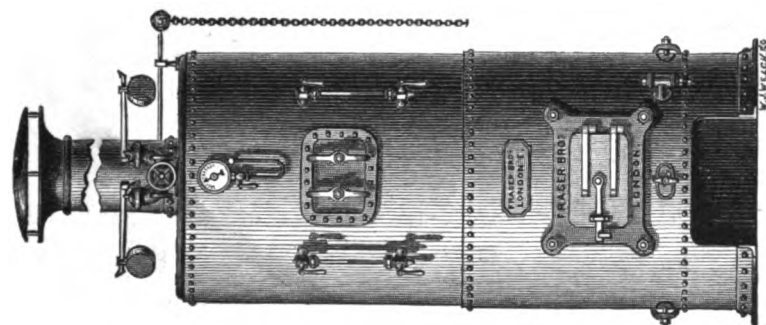
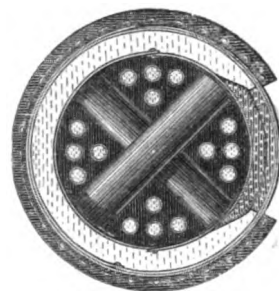
SEE PAGE 506, OR FOR FULL PARTICULARS, TO

FRASER BROTHERS,
BROMLEY-BY-BOW, LONDON, E.

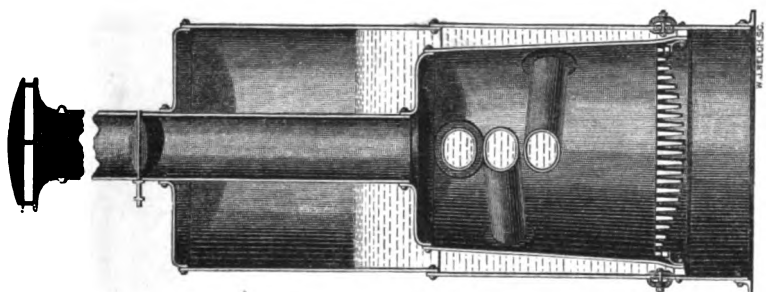
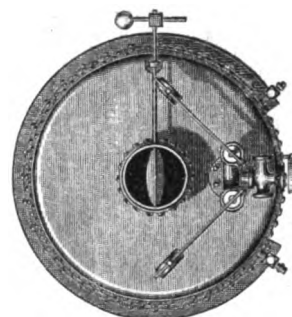
VERTICAL STEAM BOILERS.



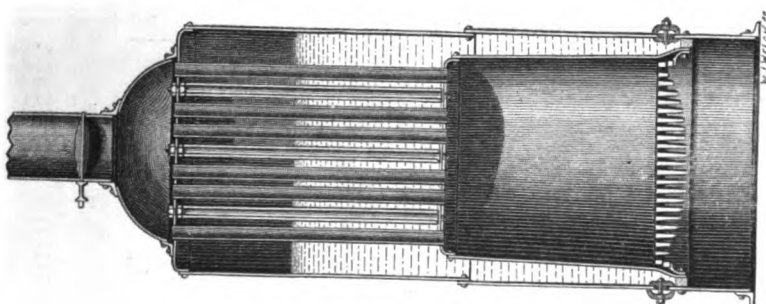
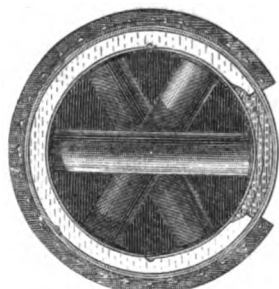
CROSS AND PENDANT TUBES.



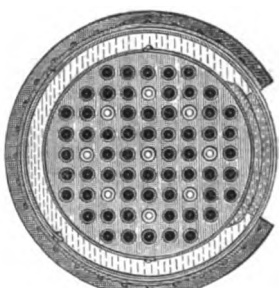
ELEVATION.



CROSS TUBES.



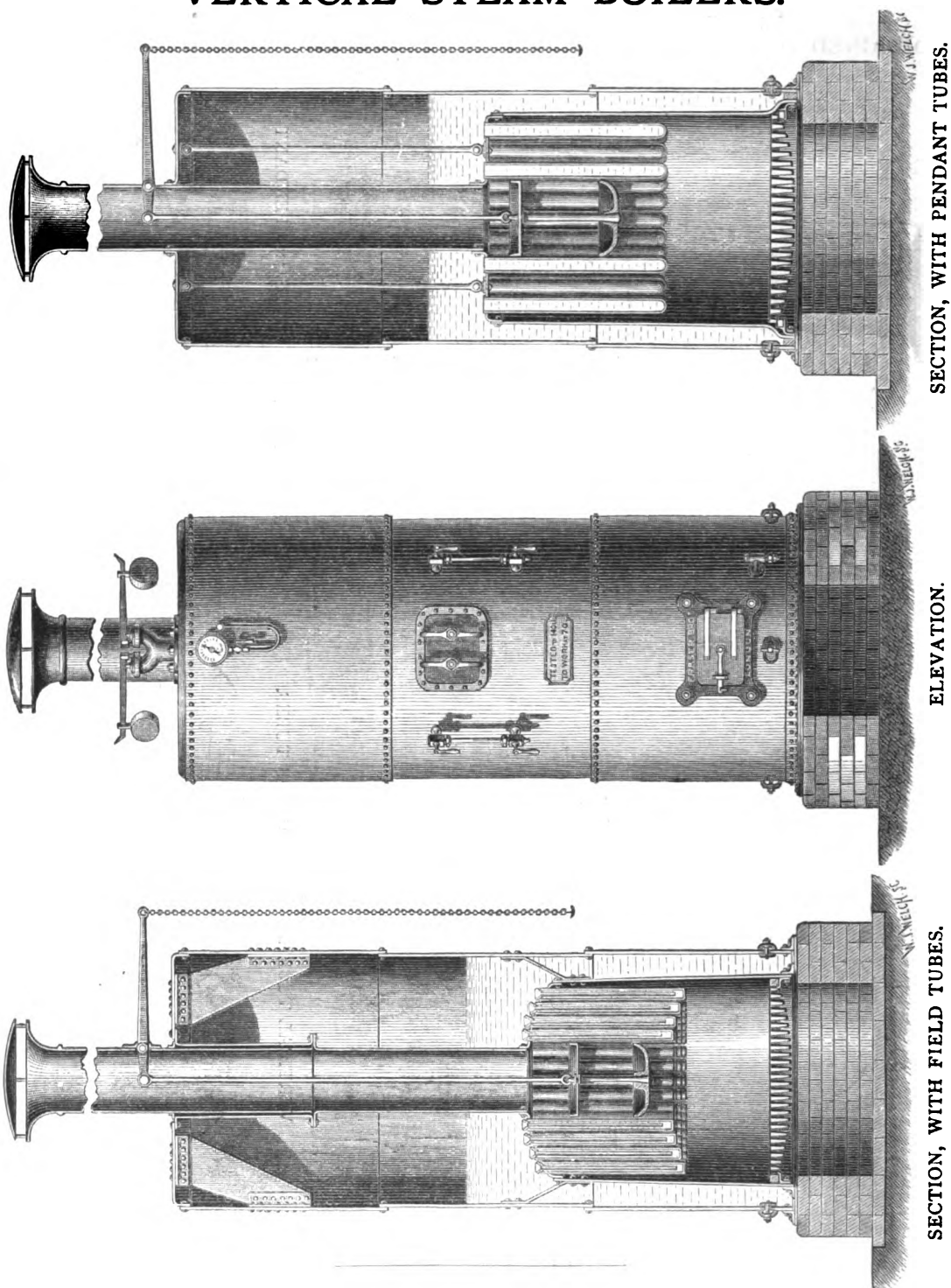
VERTICAL TUBES.



SEE PAGE 507, OR FOR FULL PARTICULARS, TO

FRASER BROTHERS,
BROMLEY-BY-BOW, LONDON, E.

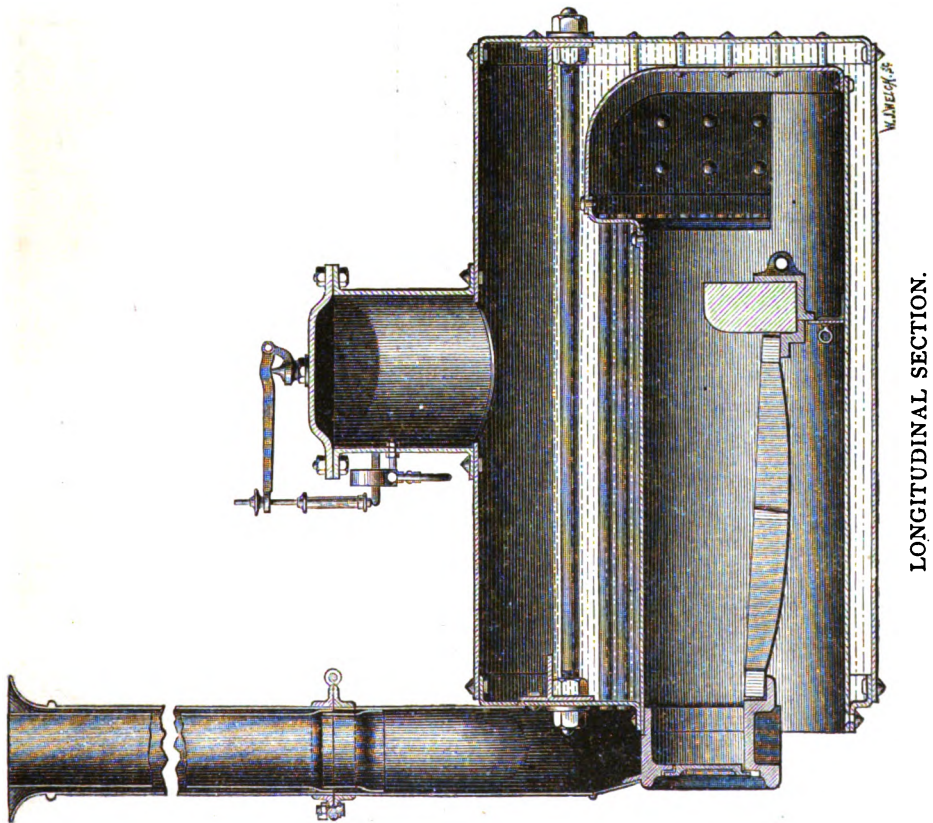
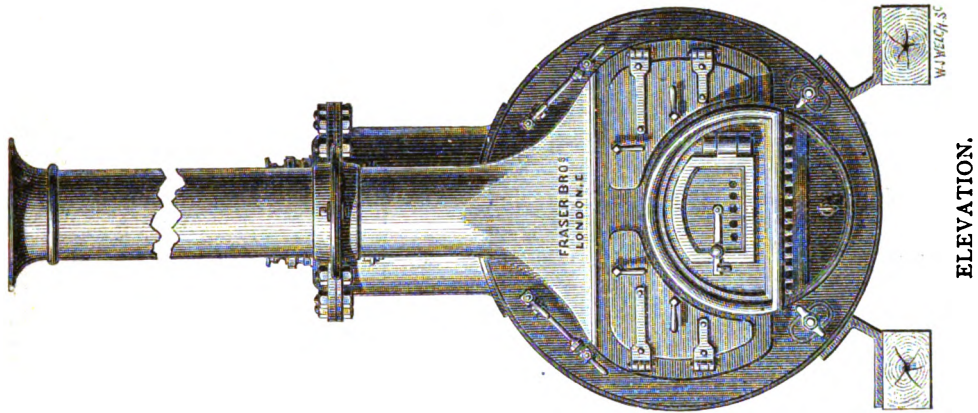
VERTICAL STEAM BOILERS.



SEE PAGE 507, OR FOR FULL PARTICULARS, TO
FRASER BROTHERS,
 BROMLEY-BY-BOW, LONDON, E.

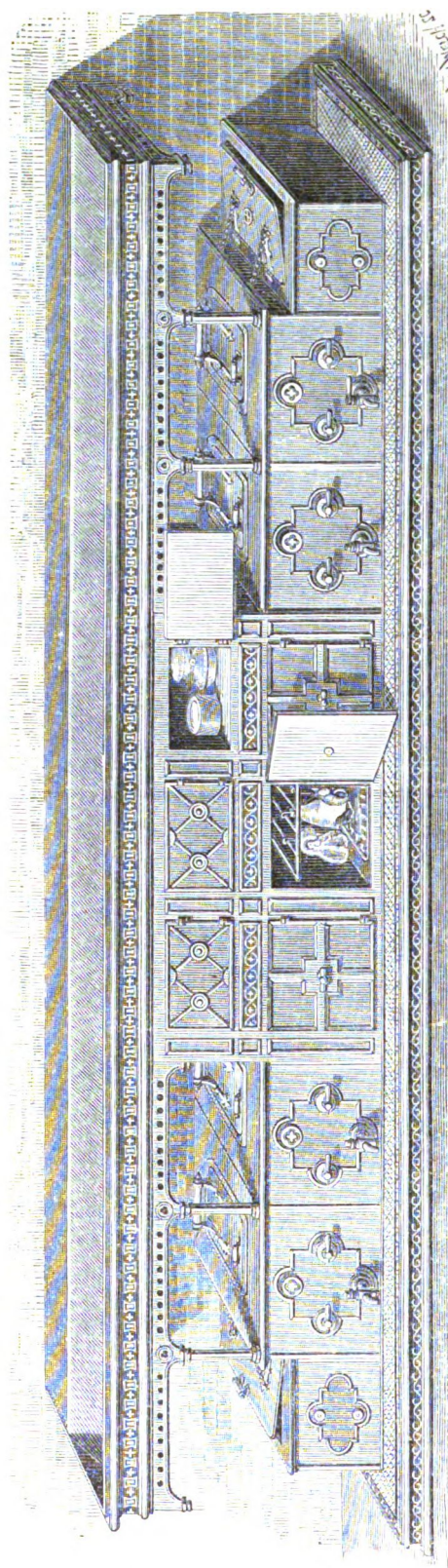
RETURN TUBE BOILER.

DESIGNED FOR SMALL STEAM-VESSLS, TUGS, LAUNCHES, AND GENERAL PORTABLE WORK.

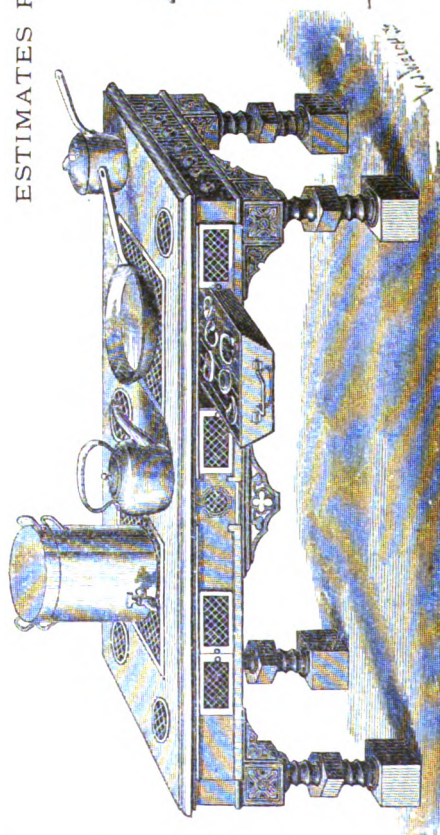


FOR PRICES AND SPECIAL DESIGNS, APPLY TO
FRASER BROTHERS,
 BROMLEY-BY-BOW, LONDON, E.

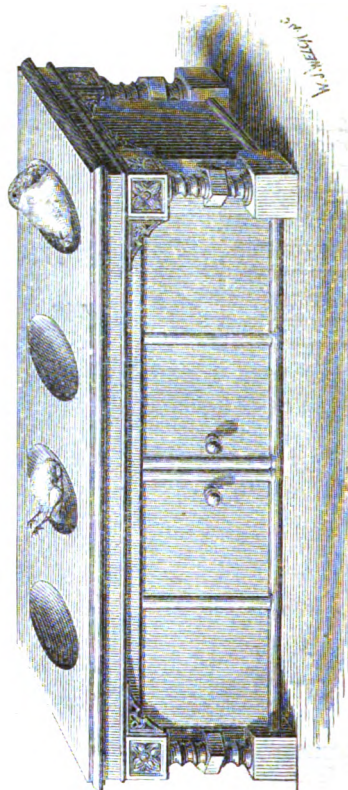
FRASER BROTHERS' COMBINED GAS AND STEAM COOKING APPARATUS.



COOKING APPARATUS OF EVERY DESCRIPTION DESIGNED FOR LARGE ESTABLISHMENTS, AND FIXED COMPLETE.
ESTIMATES PREPARED.

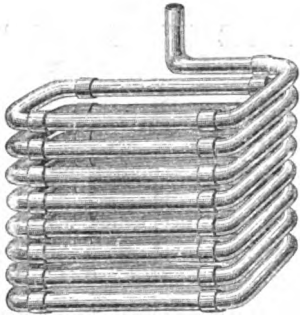


GAS TABLE FOR BOILING, STEWING, GRILLING, OR
FRYING.

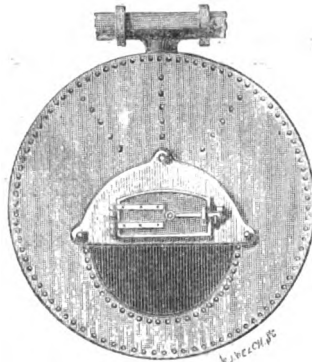


STEAM CUTTING-UP TABLE, WITH HOT CLOSET
UNDER FOR PLATES.

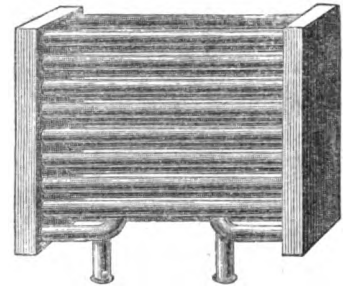
FRASER BROTHERS,
COMMERCIAL ROAD EAST.



WROUGHT-IRON STEAM COILS.

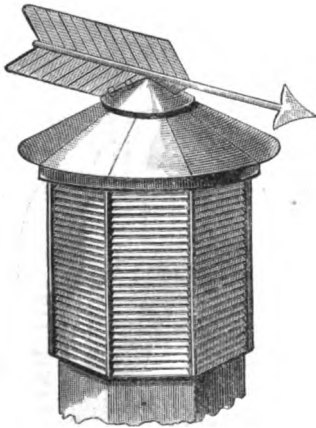


HOT-WATER BOILERS OF EVERY DESIGN.

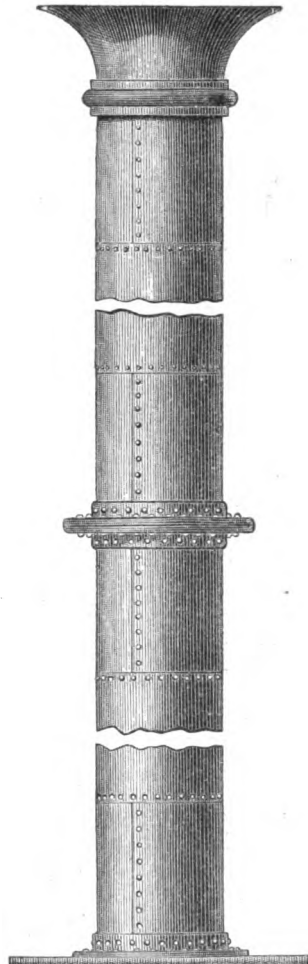


CAST-IRON HOT WATER COILS.

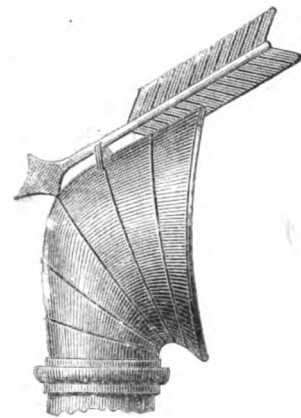
HEATING AND DRYING APPARATUS OF EVERY DESCRIPTION.



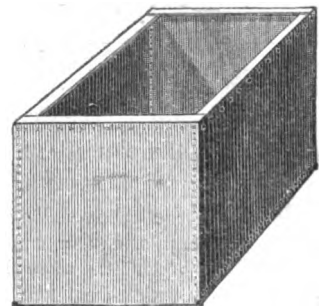
PUBLIC BUILDINGS
VENTILATED.



MANUFACTURERS OF IRON TANKS



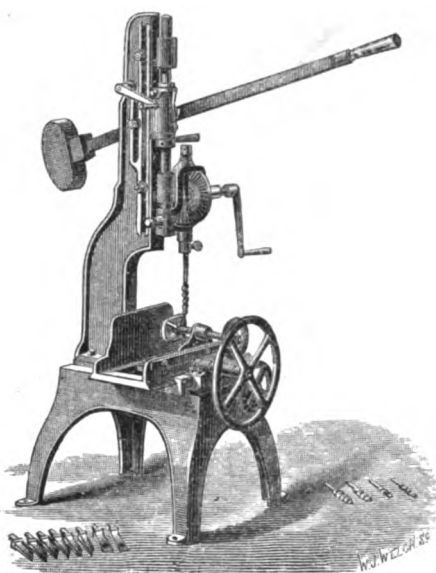
WAREHOUSES AND FAC-
TORIES VENTILATED.



AND IRON WATER-CISTERNS.

CONTRACTORS FOR IRONWORK AND ERECTORS OF IRON BUILDINGS.

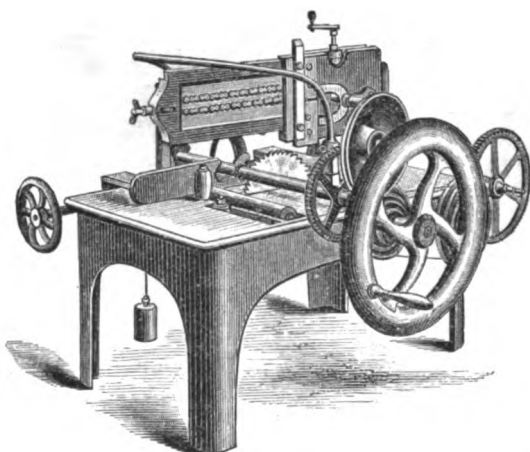
FRASER BROTHERS,
98, COMMERCIAL ROAD EAST.



IMPROVED MORTISE MACHINE.

Price, £12.

In this Machine the lever is directly connected, and gives motion to a solid wrought-iron crank, which working in a slide attached to the spindle, alternately raises and lowers the cutting tool, instead of the cast-metal rack and pinion wheel hitherto in use, the teeth or cogs of which are so liable to cause the chisel to vibrate, which would make the mortise irregular. Boring Apparatus and a set of Boring Bits, extra, £2

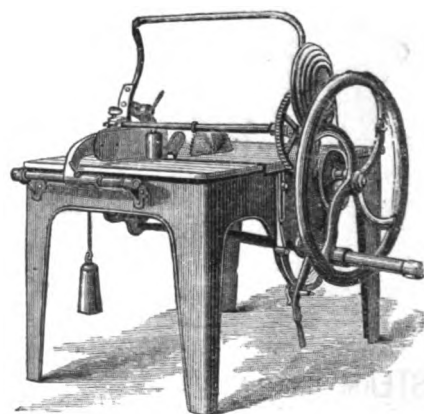


W. OLLEY'S PATENT GENERAL JOINER, OR

SELF-FEEDING HAND-POWER SAWING,
RABBETING, GROOVING, AND TENON-CUTTING
MACHINE,

Similar to the above Engraving, will cut $4\frac{1}{2}$ inches deep, and only one man or a lad is required to work it. One labourer can cut 1000 feet of 3-inch deal in a day, and can cut all the tenons for a large four-panel deal door in twelve minutes.

PRICE £25.



W. OLLEY'S SELF-FEEDING HAND-POWER SAWING AND RABBETING MACHINE.

It being Self-Feeding, only one lad or a man is required to work it. It will cut $4\frac{1}{2}$ inches deep, and do 1500 feet of $2\frac{1}{2}$ -inch in a day. Strong metal tables, solid laps, and planed.

PRICE £12 12s.

If with Rising and Falling Spindle, £14 14s.

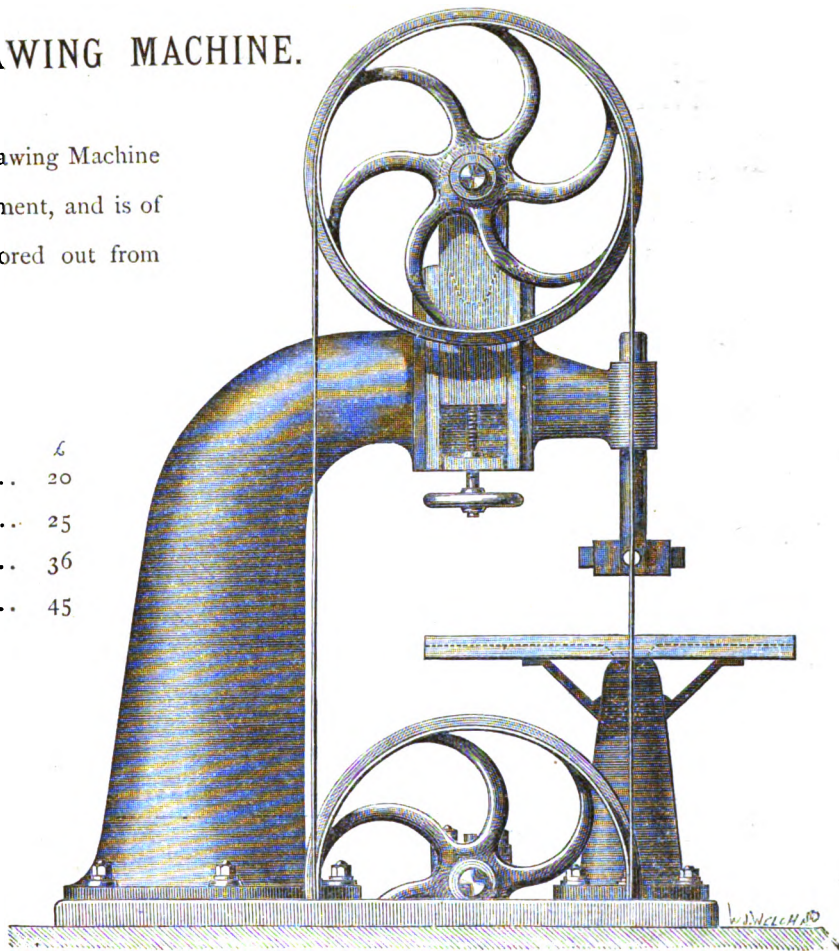
W. OLLEY AND CO.,
9, YORK STREET, LONDON ROAD, S.E.

BAND-SAWING MACHINE.

The annexed Band-Sawing Machine is of the latest improvement, and is of great strength, being cored out from bottom throughout.

PRICE.

18-inch Pulley	£ 20
24 " 	25
30 " 	36
36 " 	45



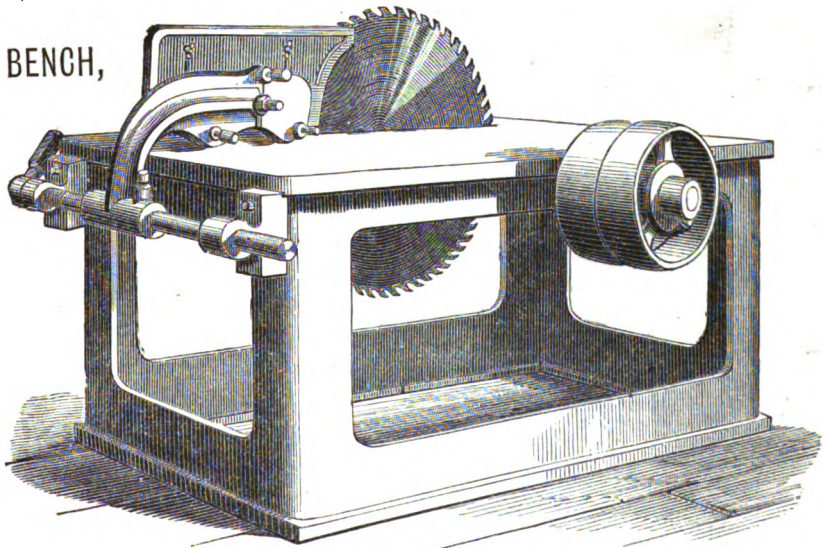
STEAM-POWER SAW BENCH,

With or without Olley's Patent Spindle.

Cast solid, and Plane Shifting Fence, and Fast-and-Loose Pulleys.

PRICE.

To take 18-inch saw ..	£ 12
" 24 " 	18
" 30 " 	24
" 36 " 	30
" 42 " 	35
" 48 " 	38
Feed Gear, £12 extra.	

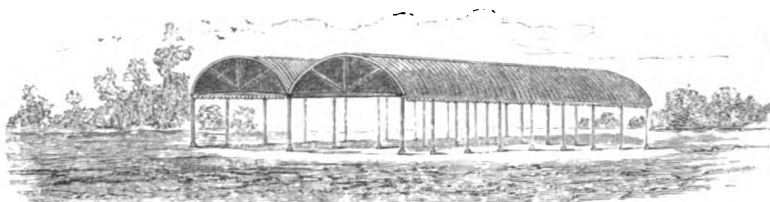


W. OLLEY AND CO.,
9, YORK STREET, LONDON ROAD, S.E.

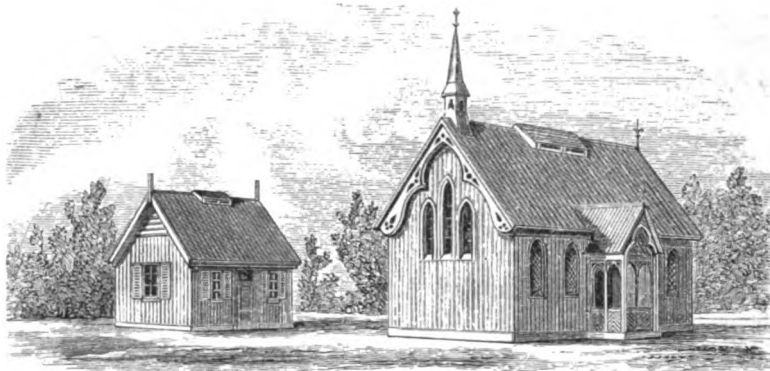
CROGGON AND CO.,

BUILDERS OF IRON WAREHOUSES, SHEDS, AND ROOFS.

Pickering's
Patent
Pulley Block.



IRON CHURCHES, SCHOOLS, AND HOUSES.



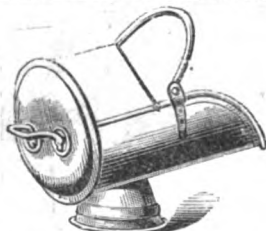
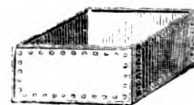
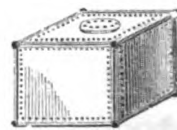
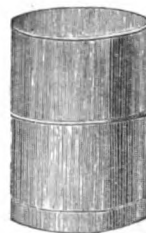
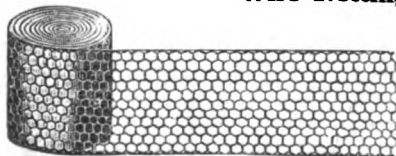
ESTIMATES FREE ON APPLICATION.

Pickering's
Patent
Sack Hoist.



CROGGON AND CO.,

Manufacturers of every description of Galvanized Iron Goods, Improved Galvanized Wire Netting, Wrought-Iron Cisterns and Tanks.



CROGGON AND CO.,

42, UPPER THAMES STREET, LONDON, E.C.; 2, GOREE PIZZAS, LIVERPOOL;
AND 59, GEORGE SQUARE, GLASGOW.

TRADE MARK.



CROGGON AND CO.,

FELT MANUFACTURERS,

TRADE MARK.



42, UPPER THAMES STREET, LONDON, E.C.

2, GOREE PIAZZAS, LIVERPOOL: AND 59, GEORGE SQUARE, GLASGOW.

CROGGON'S PATENT ASPHALTE ROOFING FELT, 1d. per Square Foot,

Has been extensively used in all climates. It is impervious to wet; a non-conductor; portable, and not liable to damage by carriage; and can be easily applied by farm servants or any unpractised person.

CROGGON'S SARKING FELT, 3d. per Square Foot, or 6d. per Lineal Yard,

Is of the same material as Roofing, but thinner, to be used under slates or metal where price is an object.

CROGGON'S INODOROUS FELT, 1d. per Square Foot.

For Damp Walls, Lining Iron Houses, &c.

CROGGON'S PATENT SHIP SHEATHING FELT.

For Covering Ships' Bottoms, &c.

CROGGON'S PATENT DRY HAIR FELT.

For Covering Steam Boilers, Pipes, &c., and thereby preventing the Radiation of Heat.

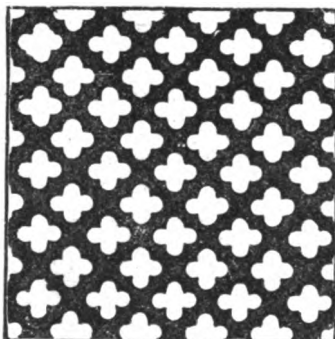
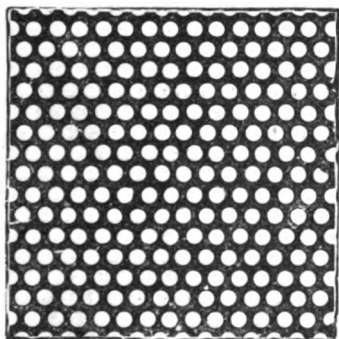
Samples and full Particulars free on application.

CROGGON'S PATENT ASPHALTE MINERAL PAINT.

For Outside Work. Ready for use.

FELT VARNISH, in 4, 6, and 8 Gallon Boxes, at 8d. per Gallon.**CROGGON AND CO.,**

GALVANIZED-IRON MERCHANTS, ZINC IMPORTERS, AND METAL PERFORATORS.



Zinc Goods of every description; Rain-Water Goods, Cast and Wrought Iron; Cocoa Fibre Mats and Matting; Indiarubber Tubing. &c.

CROGGON AND CO.,

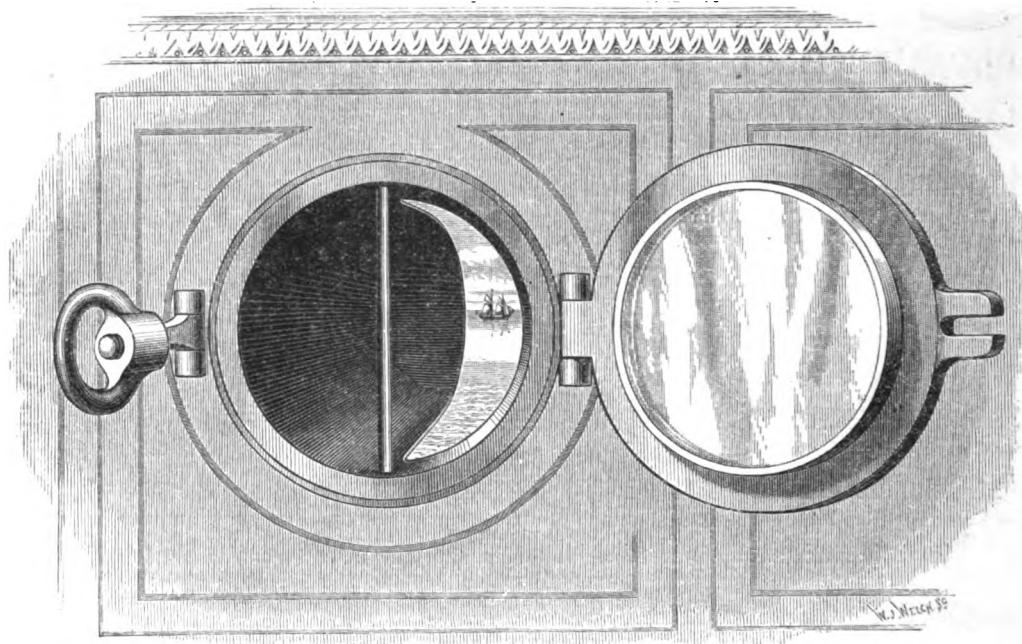
42, UPPER THAMES STREET, LONDON, E.C.; 2, GOREE PIAZZAS, LIVERPOOL;
AND 59, GEORGE SQUARE, GLASGOW.

NEW AND IMPROVED METHOD OF VENTILATING SHIPS.

ALLARDYCE'S IMPROVED PATENT WIND SHUTE

(BY ROYAL LETTERS PATENT),

FOR VENTILATING THE CABINS AND BETWEEN DECKS OF STEAMERS AND SAILING VESSELS THROUGH THE SIDE PORTS AND SCUTTLES.



The object of this invention is to supply to Passenger Steamers, Troop Ships, and Sailing Vessels employed in Tropical Navigation, a simple and effective



means of ventilating Passenger and other Cabins through the side port, by catching the air passing outside, and shooting it into the cabin.

This Improved Wind Shute will supply them with a cheap and effective means of thoroughly ventilating the cabins, while the vessel is in motion or lying at anchor head to wind, as ships always lie, except in a tideway.

Being constructed of metal, and in the shape of a half circle to fit the port, it will turn either way. A shifting bar is fixed for the purpose of reducing the amount of surface exposed to the wind in proportion to the force of the same. They are made of either brass, zinc, or galvanized iron, and in proportion to the size of the scuttle. It can be placed so as to direct the current of air to almost any part of the cabin.

In wet weather the Wind Shute may be turned against the wind, and thus act as a screen, allowing the scuttle to be open and prevent the rain from coming in, and in bright weather it may be also used as a sunshade.

A regular painted Shute (the same colour as the vessel's side) at every port scuttle will not interfere with the appearance of the vessel's outside.

Being painted white on the inside will also be the means of reflecting an additional amount of light into the cabin. Specially applicable to vessels in the Red Sea, the Mediterranean, Indian and China trade, West India, and other Tropical parts, where it will be found most useful and effective.

For Testimonials and further Particulars, apply to the Manufacturers,

JOHN H. WILSON AND CO.,

60, CORNHILL, LIVERPOOL, AND 36, KING WILLIAM STREET, LONDON, E.C.,

OR TO THE PATENTEE,

R. A. ALLARDYCE,

HYGIENIC ENGINEER, 14, QUEEN VICTORIA STREET, LONDON, E.C.

MEASURES BROS. AND CO.,

Proprietors of PHILLIPS' Patent Rights for Girders and Fire-proof Floors,

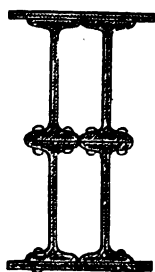
MANUFACTURERS OF

ROLLED IRON JOISTS, FLITCH PLATES, GIRDERS, ROOFING,

AND EVERY DESCRIPTION OF BUILDERS' IRONWORK.

Having always in Stock upwards of 2000 Tons of Iron Joists of the sizes given below, Orders can be executed at once from Stock, and at Low Prices.

PATENT GIRDERS.



JOISTS.

Inches.	Inches.	Inches.
16 by 5½	9½ by 3½	4 by 3
15 " 5	8 " 5	3 " 3
14 " 5½	8 " 4	7 " 2
12 " 6	7 " 3½	6 " 2
12 " 5	6 " 5	5 " 2
10 " 5	6 " 3	4 " 2
10 " 4½	5 " 4½	
9½ " 4½	5 " 3	

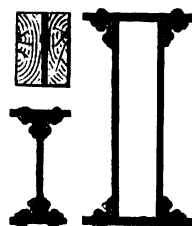
Lengths from 8 feet to 36 feet.
ALL OTHER SECTIONS MADE CAN
BE SUPPLIED.

PLATES.

Inches.
18 by ½
16 " ½
14 " ½
12 " ½
12 " ½
12 " ½
10 " ½
10 " ½
9 " ½
8 " ½
6 " ½

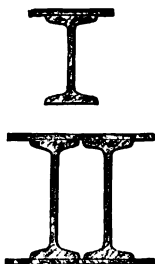
12 feet to 30 feet long.

RIVETED GIRDERS.

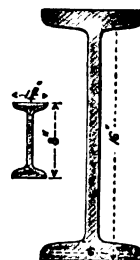
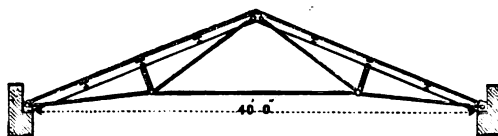


PRICES, &C., ON APPLICATION.

PATENT GIRDERS.



ROLLED IRON JOISTS.



SHEETS OF SECTIONS AND PRICES ON APPLICATION.

Designs and Estimates free on receipt of particulars.

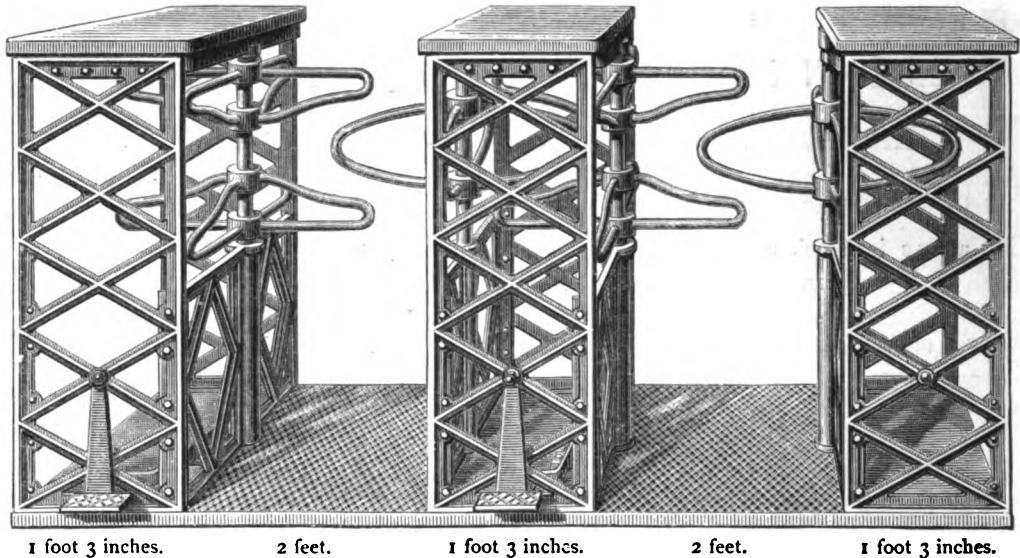
PHILLIPS' PATENT FIRE-PROOF FLOORS.

MEASURES BROS. AND CO.,

IRON CONTRACTORS AND ENGINEERS. WORKS: SOUTHWARK STREET;
REDCROSS STREET; AND WORCESTER STREET, LONDON, S.E.

MANCHESTER OFFICE: 6, BOND STREET.

BEZER'S
PATENT REVERSIBLE DOUBLE TURNSTILE,
 FOR TOLL BRIDGES, PIERS, PLACES OF PUBLIC AMUSEMENT, &c.
 ALSO FOR TRAMCARS AND OMNIBUSES.



This Turnstile consists of two vertical shafts, each carrying arms. The shafts are geared together so that one cannot revolve without the other. It secures, amongst others, the following advantages :

The arms being only 14 inches long, instead of 18 inches as in an ordinary four-armed single Turnstile, and the following-up arms closing round from each side of the person passing, instead of only from one side, it effectually prevents two persons passing at the same time.

The arms being shorter, the circle described is less than that of a single Turnstile, thereby admitting of a more rapid ingress and egress.

The locking gear is reversible, so that persons can enter and leave through the same Turnstile, but when the Turnstile has been partially opened, it cannot be reversed until that entry has been recorded.

By this arrangement one of these Turnstiles answers the purpose of two ordinary Turnstiles. This is a special advantage in places where the passages are too narrow to admit of the ordinary entry and exit Turnstile, as for instance the approaches to the Pit and Gallery of Theatres ; also in places where on special occasions many thousands of people assemble. On such occasions, at one time during the day there might be a continual flow of entries, when all the Turnstiles could be used as entrances ; and throughout the day any Turnstile for entry and exit. Towards the end of the day, when no further entries would be made, the keepers could set the lock of each Turnstile, making them all exits, and leave them for persons to pass out at their leisure.

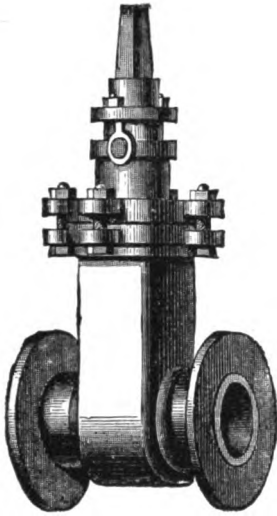
The Reversible Lock can be fitted to Turnstiles now in use.

The Inventor having devoted some years' study to the system of check by Turnstile, has designed instead of, or in addition to, the ordinary counter, a registering apparatus, the main principle of which is that the time of each entry and exit is automatically recorded.

The attention of Tramway and Omnibus Companies is invited to his apparatus for recording the place of entry and exit of each passenger, for which a light design of Turnstile and Platform has been made to suit the vehicles now in use.

Upon application, stating the number of entrances required, Prices will be forwarded.

WHIELDON AND COOKE,
 ENGINEERS,
 COLLINGE ENGINEERING WORKS, WESTMINSTER BRIDGE ROAD, S.E.



WATER MAIN SLUICE VALVES, FOR HIGH OR LOW PRESSURE.

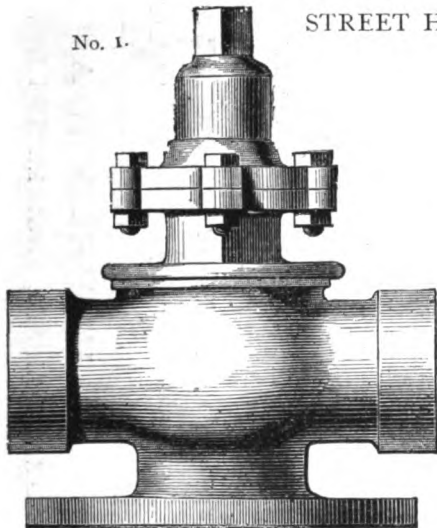
These Sluice Valves, tested to bear a pressure of 400 feet head of water, are double-faced, having two gun-metal faces on body of Sluice and two on Valve, and are provided with gun-metal screws and nuts.

PRICES OF SLUICE VALVES WITH FLANGED OR SOCKETED ENDS.

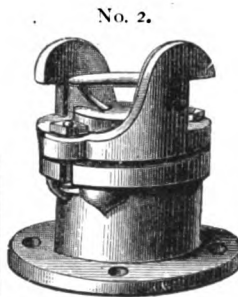
Inches	1½	2	2½	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	24	30	36
Price	31/6	35/	44/	53/	70/	90/	110/	133/	160/	187/	210/	250/	265/	355/	425/	440/	480/	575/	685/	910/	1165/	1820/
*	5/3	6/	7/3	8/9	11/	13/9	17/6	22/6	27/6	33/	37/6	43/	48/6	60/	76/	95/	121/	136/	177/	243/	33c/	396/

* EXTRA, SPIGOT AND SOCKET ENDS.

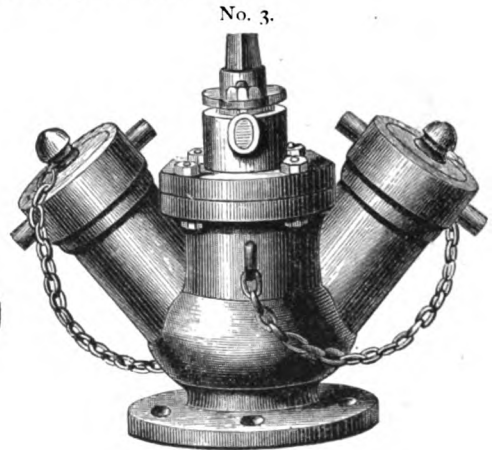
STREET HYDRANTS AND FIRE COCKS, AS SUPPLIED TO THE ROYAL ARSENAL, WOOLWICH.



No. 1.



No. 2.



No. 3.

No. 1. This simple and compact Two-Way Fire Cock, with all working parts well protected, is made of any required size, from 1½ inch diameter of outlet upwards.

PRICES WITH DOUBLE (OUTLET AND BRIGADE GAUGE NOZZLE COMPLETE.

1½ inch, £3 3s. | 2 inches, £5 5s. | 2½ inches, £7 10s. | 3 inches, 15s.
Prices of other sizes on application.

No. 2 is a cheap Hydrant, being made entirely of Iron, with a floating ball to close orifice when not in use.

PRICE OF HYDRANT, 15s. | SURFACE BOX, 7s. 6d. | STAND PIPE, WITH CAP AND SCREW, 70s.

No. 3. Two-Way High-Pressure Hydrant, specially designed for Her Majesty's Government, bushed with gun metal, and screwed to Brigade Gauge, with cap and chain complete. Prices on application.

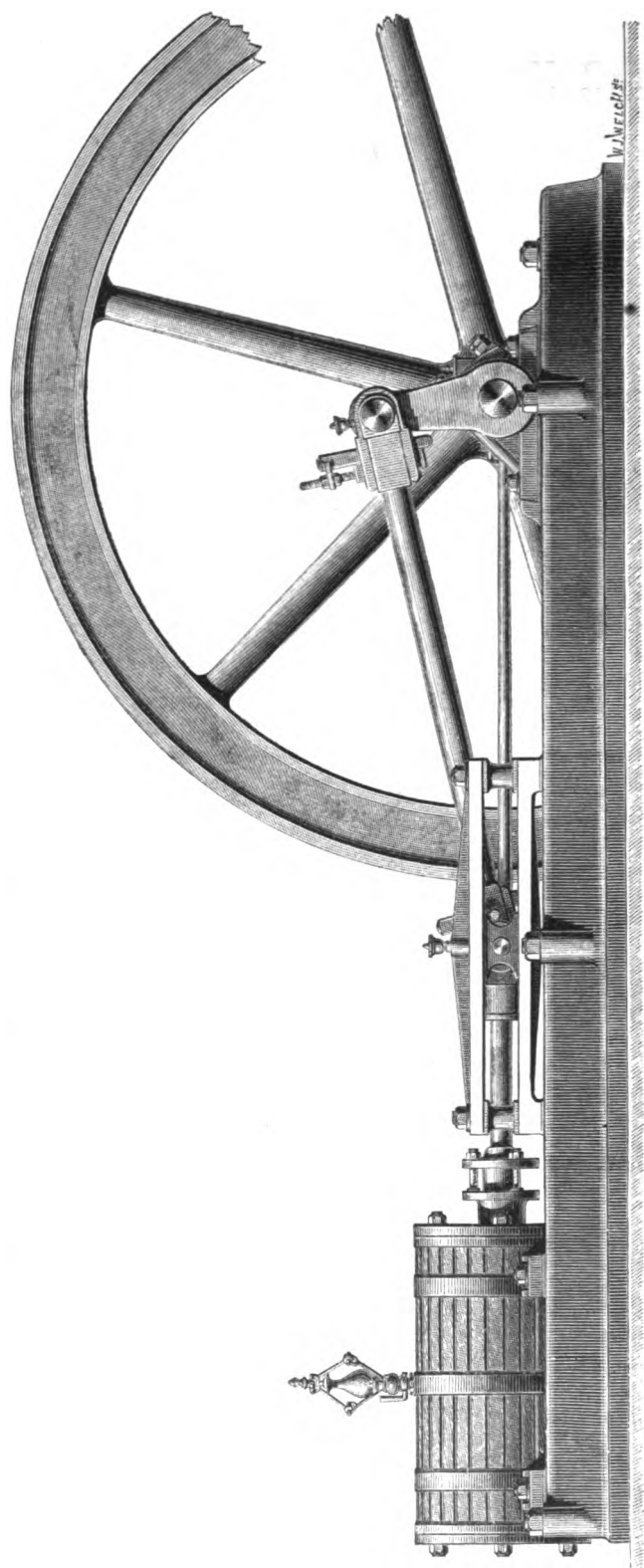
WHIELDON AND COOKE,

HYDRAULIC ENGINEERS,

COLLINGE ENGINEERING WORKS, WESTMINSTER BRIDGE ROAD, S.E.

3 x 2

HORIZONTAL HIGH-PRESSURE FIXED ENGINES.



FITTED WITH PORTER'S GOVERNOR, FEED-PUMP, AND EXPANSION VALVE,
 PISTON ROD AND THROTTLE-VALVE SPINDLE OF STEEL;
 BRASS BEARINGS, AND SOLID CAST-IRON BED PLATE.

THE WHOLE OF THE BEST WORKMANSHIP, MATERIAL, AND FINISH.

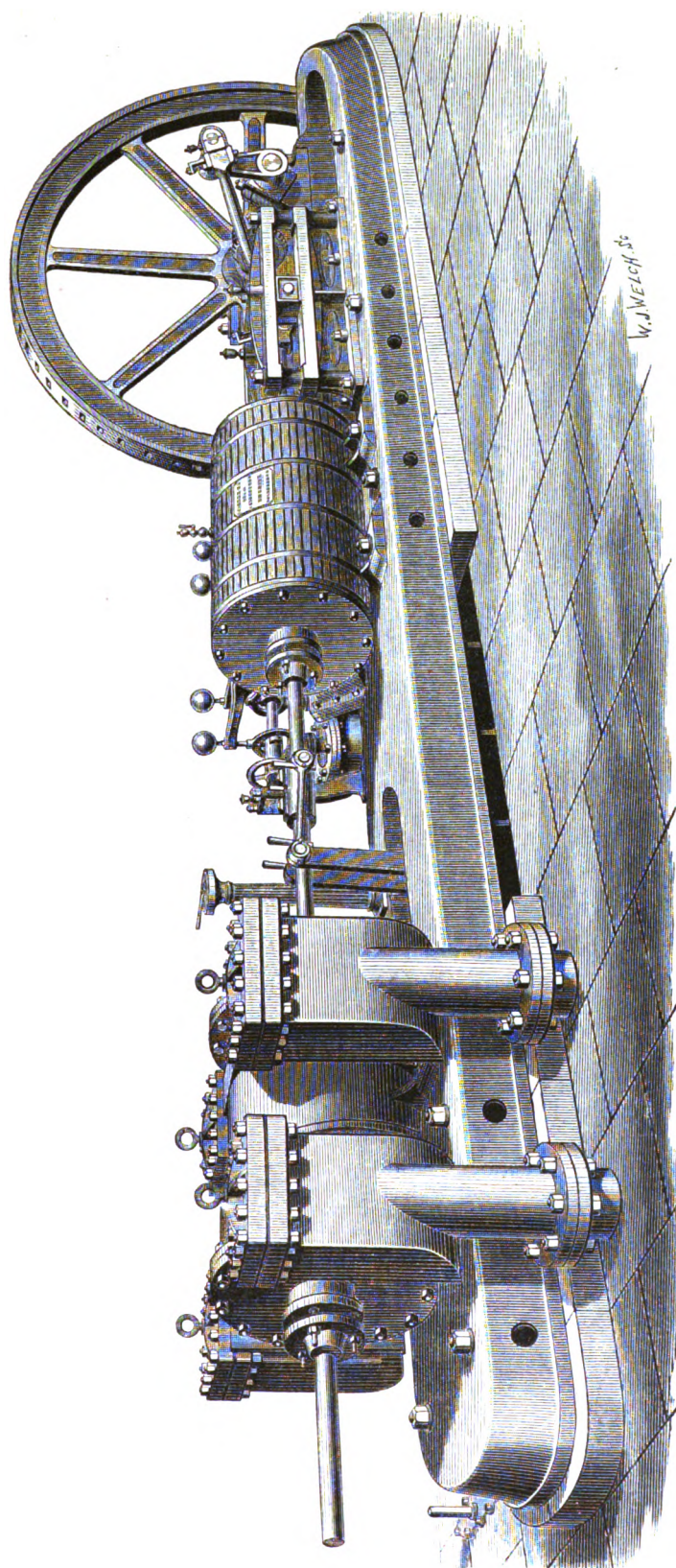
PRICES ON APPLICATION.

WHIELDON AND COOKE,

HYDRAULIC ENGINEERS, COLLINGE ENGINEERING WORKS, WESTMINSTER BRIDGE ROAD, LONDON.

HYDRAULIC PUMPING MACHINERY,

FOR WATER AND SEWAGE WORKS.

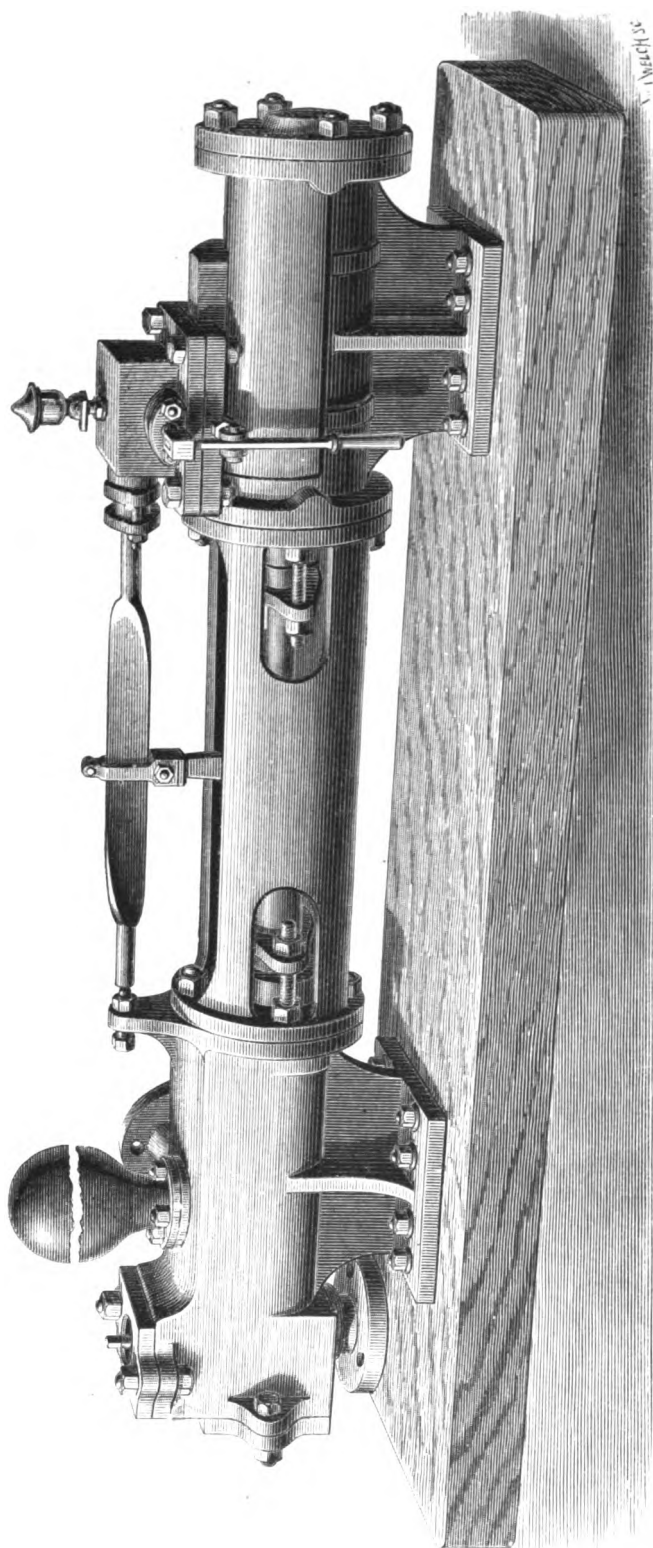


THE ABOVE IS A VIEW OF THE PUMPING MACHINERY ERECTED BY WHIELDON AND COOKE FOR THE TOTTENHAM LOCAL BOARD OF HEALTH,
FOR RAISING THE SEWAGE OF THAT DISTRICT AT THE RATE OF 170,000 GALLONS PER HOUR.

WHIELDON AND COOKE,

HYDRAULIC ENGINEERS, COLLINGE ENGINEERING WORKS, WESTMINSTER BRIDGE ROAD, LONDON.

THE "COLLIDGE" STEAM PUMP.



This Steam Donkey-Pump is of extremely simple construction, having no rotating parts or complicated valve-gear. It is a double-acting Pump, worked direct by a steam piston, the slide valve of which is actuated by a simple contrivance reducing the number of parts.

From its construction it will be seen that this Pump will work equally well in any position, horizontal, vertical, or oblique, and is therefore well adapted for feeding Boilers on board ship as well as on land. It can be applied to lifting water from wells, and in fact anywhere where water has to be forced or lifted, and where steam can be employed. It can be started at any position of stroke.

The various sizes are numbered according to the cubic capacity of the pump barrel; that is to say, the number of the Pump is the number of gallons delivered during each ten strokes of the piston, so that by multiplying the number of strokes per minute by the number of the Pumps, and dividing by ten (in other words pointing off the last figure) the number of gallons pumped per minute can at once be obtained.

PARTICULARS AND PRICES.

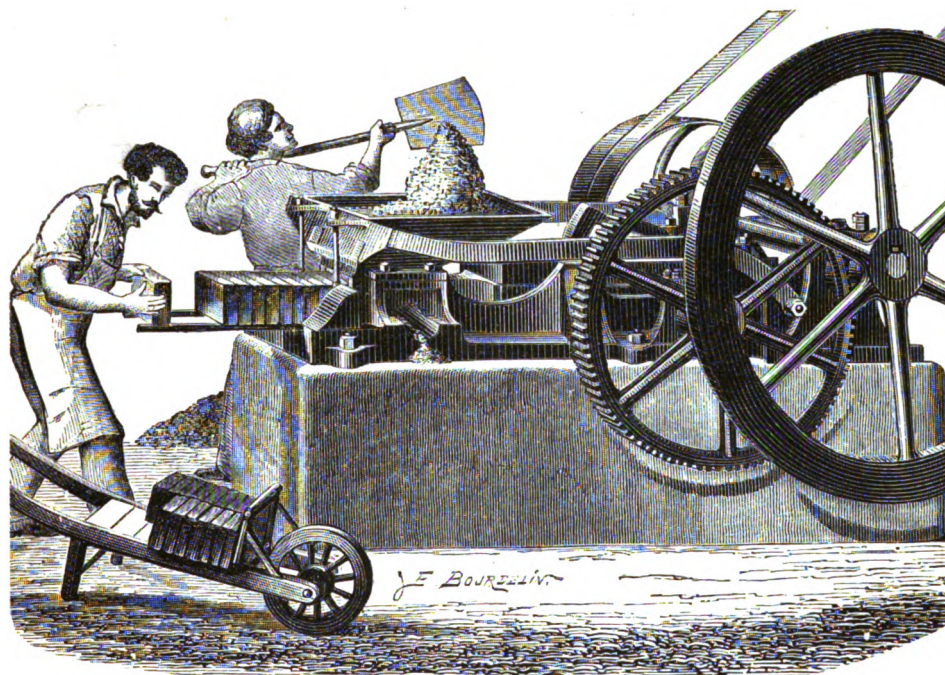
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Number of Pump	2	2	4	4	6	6	10	10	12	12	16	16	19	19	23	23	23	23
Diameter of Water Cylinder	2"	2"	2 1/2"	2 1/2"	3 1/4"	3 1/4"	4"	4"	4 1/2"	4 1/2"	5"	5"	5 1/2"	5 1/2"	6"	6"	6"	6"
Diameter of Steam Cylinder	3	4	3 1/4	4	5	5	6	6	6 1/2	6 1/2	7 1/2	7 1/2	8	8	8 1/2	8 1/2	8 1/2	8 1/2
Stroke	10"	10"	10"	10"	10"	10"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"
Price	£18	£19	£20	£22	£24	£26	£28	£31	£34	£37	£40	£43	£46	£49	£52	£55	£55	£55

WHEELDON AND COOKE,

COLLIDGE ENGINEERING WORKS, WESTMINSTER BRIDGE ROAD, S.E.

MACHINE FOR THE MANUFACTURE OF BRICKS, TILES, COMPRESSED FUEL, AND CONCRETE.

DURAND AND MARAIS' PATENT.



By means of this Machine almost any kind of Clay or Earth, without previous preparation, introduced into the Hopper, is, by being subjected to considerable pressure, instantly converted into Bricks of great solidity, with sharp angles and firm, clean edges, and very nearly ready for the Kiln.

This Machine cannot be overstrained, as provision is made whereby the surplus Clay escapes through an opening in the face of the Compressing Plunger, so that the density of the Bricks, when they leave the mould, is the same throughout.

The different parts of the Machine, being simple and very strong, work with great smoothness and cannot get out of order, except by ordinary tear and wear. The removal of the Bricks from the mould is effected gently by a sliding movement, and they consequently adhere neither to each other nor to the Plunger.

This Machine is also applicable to the preparation of compressed fuel, or indeed to the moulding of any substances capable of agglomeration.

When required, a Self-Feeding Apparatus can be attached to each Machine.

The Moulds can be varied to suit any size or shape required.

The Machine is self contained, requiring no foundation.

A couple of Horses, or an Engine of equal power, with one unskilled labourer and two boys, can work the Machine, producing in ten hours upwards of 10,000 Bricks. Weight, about two tons.

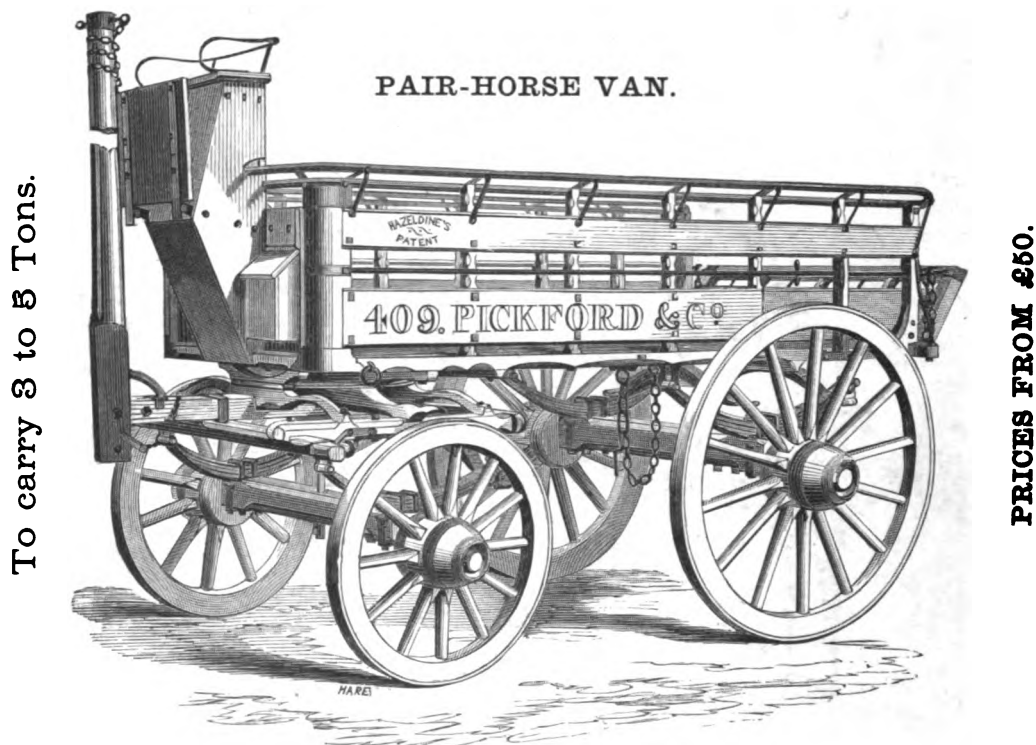
PRICE OF THE MACHINE, INCLUSIVE OF ROYALTIES £125

EXTRAS.

	£	s.	d.
Self-Feeding Apparatus, about	10	0	0
Duplicate Brass Moulds for common Bricks, each	3	10	0
Horse or Bullock Gearing with Cast-Iron Bed Plate, Crown Wheel and Bevel } Wheel Shaft making ten revolutions of the Machine to one of the Horse Wheel, and strong enough for two Horses or six Bullocks	34	0	0
A 2 Horse-power Vertical Engine and Boiler	90	0	0
A 2½ Horse-power Portable Engine, complete	125	0	0
Wheels and Axles for moving the Machine from field to field	7	0	0

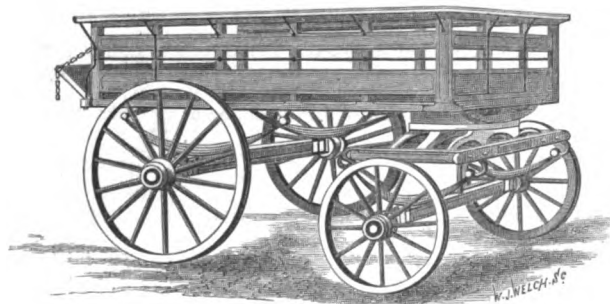
WHIELDON AND COOKE,
COLLIDGE ENGINEERING WORKS, WESTMINSTER BRIDGE ROAD, S.E.

HAZELDINE BROS., LANT STREET, BORO', LONDON (ENGLAND).



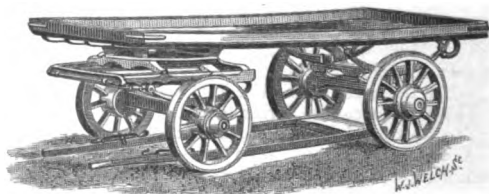
MANUFACTURERS OF EVERY DESCRIPTION OF VAN, WAGON, CART, TROLLEY, TIMBER AND GIRDER CARRIAGE, &C., FOR RAILWAY CARRIERS, ENGINEERS, AND OTHERS.

ONE-HORSE VAN.



TO CARRY 15 TO 40 CWT.
Prices from £40.

TROLLEY or LORRY.



TO CARRY 2 TO 50 TONS.
Prices from £35.

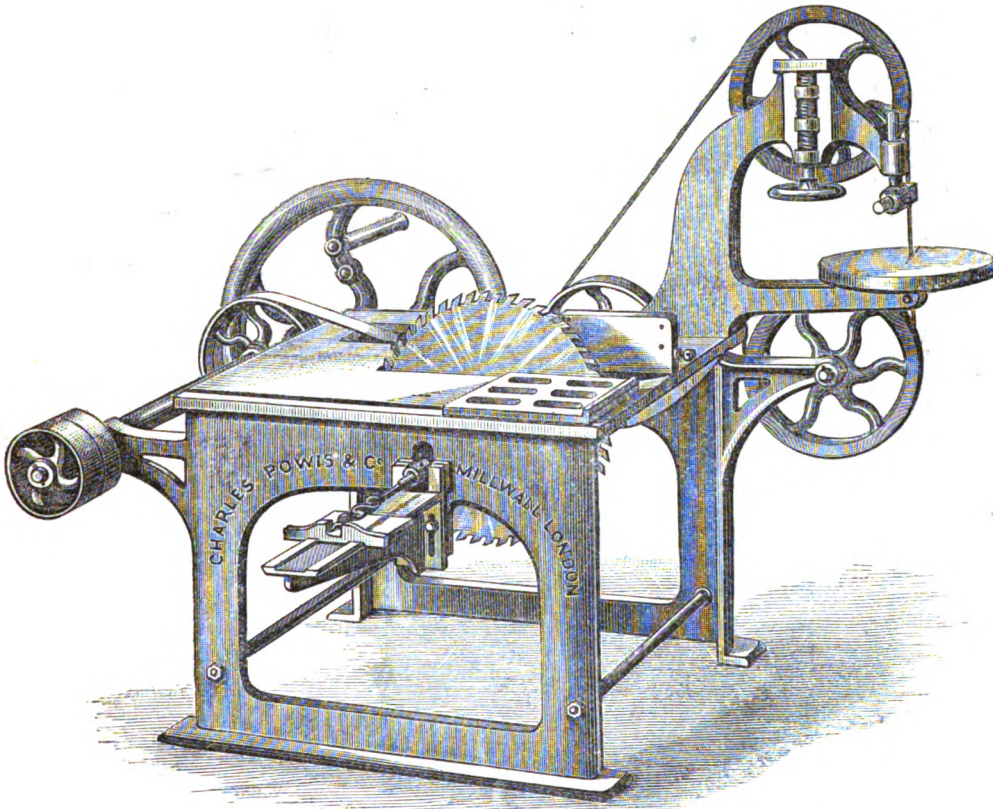
AXLETREE MAKERS OF EVERY SIZE AND DESCRIPTION.

MULE-CART AND WAIN AXLES FOR THE COLONIES, AND HOOP TIRES ANY DIAMETER AND WIDTH TO ORDER.

These Vehicles are usually supplied with our Patent Axles, requiring to be "greased" about four times a year. From 6000 to 7000 are in daily use in London alone.

HAZELDINE BROS.,
LANT STREET, BORO', LONDON (ENGLAND).

PATENT COMBINED CIRCULAR AND BAND SAWING MACHINE, WITH BORING APPARATUS.



The Machine illustrated above can be worked either by Hand or Steam Power, and is specially adapted for the requirements of Coach Builders, Pattern and Chair Makers, Joiners, and others. It is fitted with a cross-cutting slide, and has a rising and falling spindle for Grooving, Rabbeting, Shouldering, &c. When intended for hand power, the circular saw is arranged to cut 5 inches deep, or with steam power it is made to cut 8 inches deep. The band saw will deep 5 inches, and cut any curved, irregular, or ornamental design; tension is given to the saw by a spring tension apparatus, which effectually prevents breakages. The fence, as well as the band-saw table is made to cant to any angle up to 45 degrees. The spindle for boring will carry augers up to $1\frac{1}{2}$ inch diameter, and the table can be raised or lowered. The great advantages in this Machine are: The band saw being arranged to travel over three pulleys is not so liable to break, and wood of any length or width can be cut with it. The boring apparatus is fixed on the opposite side of fly wheel, so that any length of wood can be bored. The bench being driven by a belt, gives a smooth and easy motion, and cannot get out of order, as when driven by the old method of cog or gear wheels, and the power required is much less.

PRICES.

Complete with Band Saw, Boring Table, and Rising and Falling Spindle.	Without Band Saw.	Without Band Saw and Boring Table.	Without Band Saw, Boring Table, Cross-cutting Slide, and with Fixed Spindle.
£ 26 s. 10 d. 0	£ 22 s. 10 d. 0	£ 21 s. 0 d. 0	£ 18 s. 0 d. 0

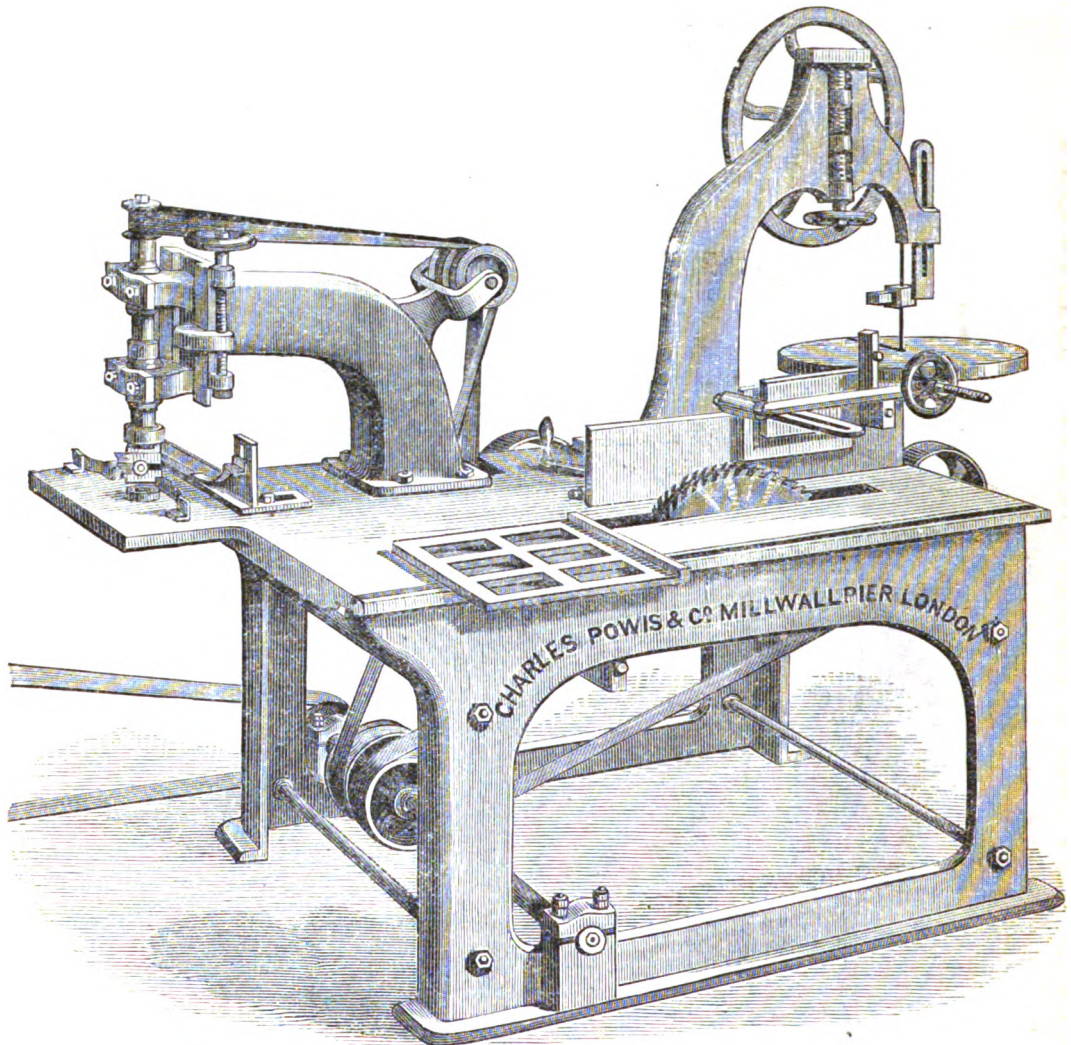
Fast-and-Loose Pulleys for Steam Power, 20s. extra.

CHARLES POWIS AND CO.,
ENGINEERS,

MILLWALL PIER, LONDON, E. CITY OFFICES: 60, GRACECHURCH STREET, E.C.

3 Y

PATENT COMBINED CIRCULAR, BAND SAWING, & MOULDING MACHINE.



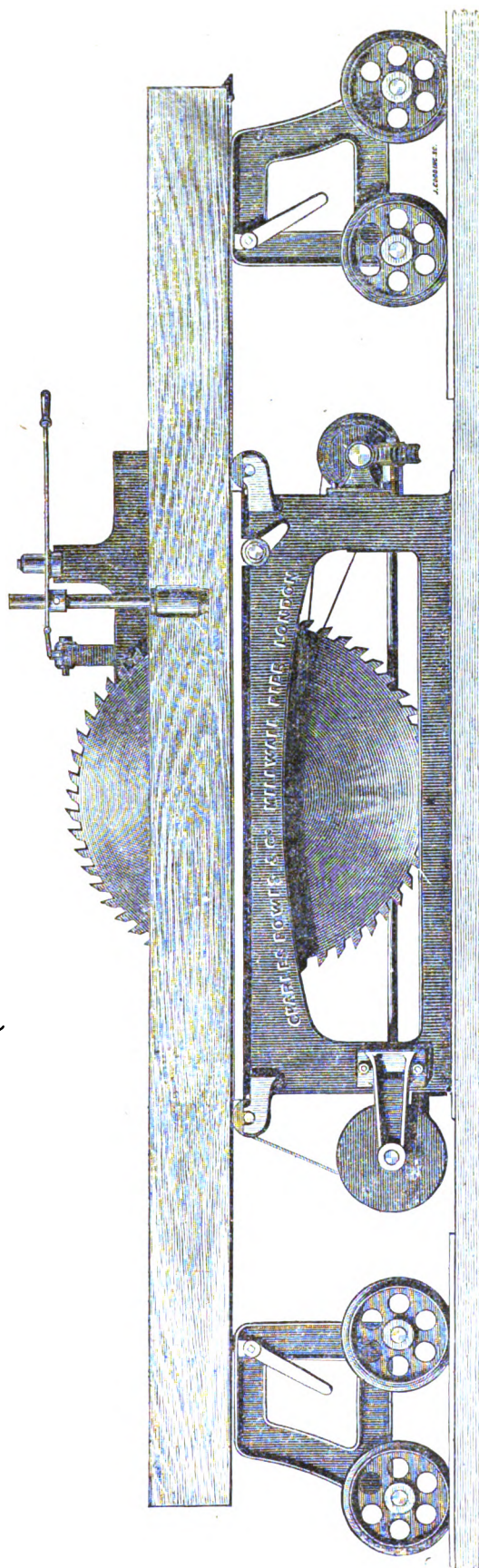
This Illustration represents an entirely New Machine for performing certain operations in the cutting and converting of Wood for various purposes never previously effected in one Machine, consisting of a Circular Saw, Band Saw, Recessing, Moulding, and Housing Machine. The Circular Saw is mounted so that it is perfectly clear of the other parts of the Machine, and is fitted with a cross-cutting slide, and the spindle has a rising and falling motion, adapting it to fulfil all the purposes usually required for what is known as a Joiner's Bench: viz. Sawing, Rabbeting, Grooving, Tenoning, and Moulding. A long Fence is fitted, having an angular movement, and is carried along the face of the Saw a sufficient distance to allow the Tenoning Apparatus to travel the distance necessary to make the Tenon; and for which purpose two Saws are used, as illustrated; or the Tenon may be made at one operation by using our patented Disc-Cutters. The Band Saw is fixed in such a position as to be entirely free, and wood of any length may be cut into any curved, irregular, or ornamental design; it is driven by a countershaft self-contained in the Machine, whereby its motion is independent of any other part, and it is fitted with our Patent Tension Apparatus to secure equal tension of the Saw at all times. The Recessing is performed at the opposite end of frame-work to that occupied by the Band Saw, and may be employed for a variety of uses, such as making straight or curved Mouldings, Grooving, doing the Housings for Stairs, and every other purpose to which a Recessing Machine can be applied. Simplicity of parts is attained in the combination of these three Machines, together with thorough effectiveness.

Price, including two Saws for Tenoning, one Band Saw, one Cutter Block, and Self-Contained Belts, £70.
Boring Apparatus fitted to ditto, extra, £5.

CHARLES POWIS AND CO.,
ENGINEERS,
MILLWALL PIER, LONDON, E. CITY OFFICES: 60, GRACECHURCH STREET, E.C.

SELF-ACTING CIRCULAR-SAW BENCH

(WITH TIMBER CARRIAGES AND RAILS).



This Bench is adapted for cutting planks, deals, and battens, at speeds varying from 15 to 50 feet per minute. The saw spindle is made of the best scrap iron (or steel, if preferred), and runs in long gun-metal bearings, the outer end of which is supported by an **Outside Standard**. A self-acting feed-motion is attached, specially designed with a view to economy in space and efficiency in working. The fence can be set at an angle for cutting feather-edged boards, and always maintains a parallel position with the saw, whatever be the angle at which it may be placed. If the Bench be required for cross-cutting, the fence can be removed with very little trouble. The framing and table-top being cast in one piece, great strength, combined with portability, is obtained. No brick foundation is required, its own weight being sufficient to keep it steady while working. The timber carriages supplied with this Machine have rollers in front, running upon **Eccentric Spindles**, whereby great facility is given in raising the Timber from the bed of the carriage when it is knotty or uneven.

When this Machine is wanted without Timber Carriages and Rails, it is £20 less.

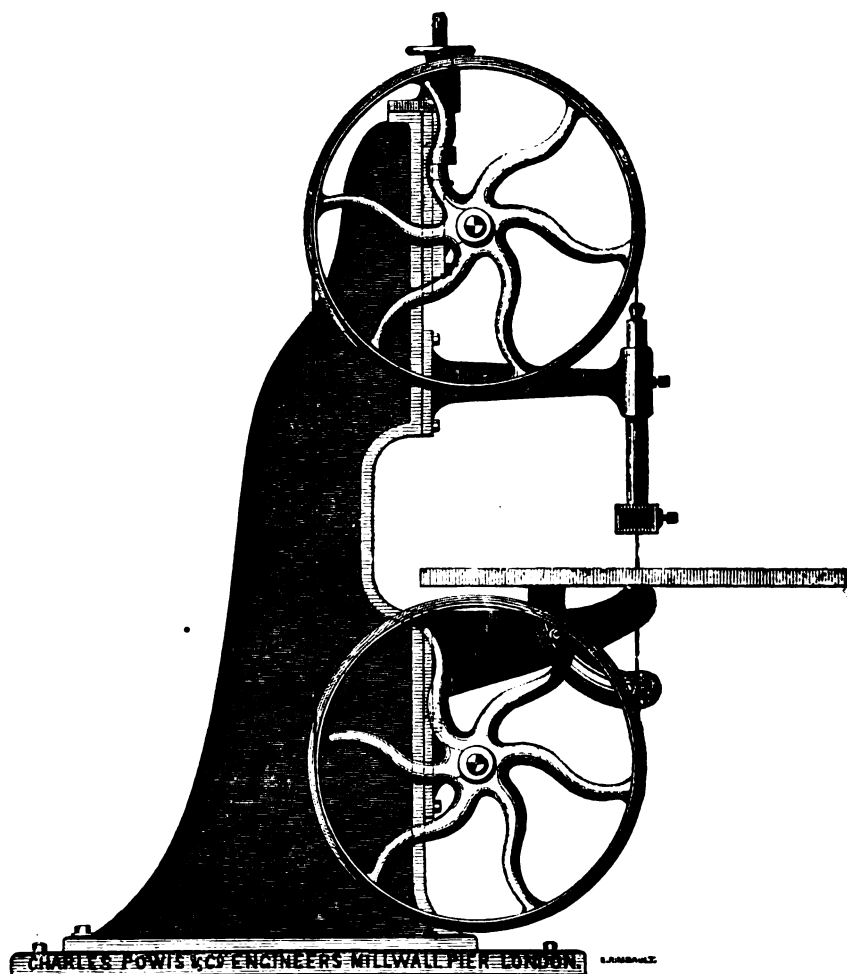
Four Sizes are made, as under:

No.	To take a Saw.	To Cut.	Size of Table.	Driving Pulleys.		Price.	
				12 inches diameter	14 inches diameter	£	s. d.
1	36 inches diameter	15 inches deep	5 feet 9 inches by 2 feet 9 inches	12	14	80	0 0
2	42 "	18 "	6 " 0 " 3 " 0 "	14	16	90	0 0
3	48 "	21 "	7 " 0 " 3 " 3 "	16	16	100	0 0
4	54 "	24 "	7 " 6 " 3 " 6 "	16	16	110	0 0

CHARLES POWIS AND CO.,

ENGINEERS, MILLWALL PIER, LONDON, E. CITY OFFICES: 60, GRACECHURCH STREET, E.C.

ENDLESS BAND SAWING MACHINE.



The above Illustration represents our Endless Band Sawing Machine, which is adapted for cutting wood into any circular, irregular, angular, or straight form. It will be found most useful for Engineers for pattern making, Cabinet Makers, Chair Makers, Wheelwrights, Joiners, and others using sawing machinery.

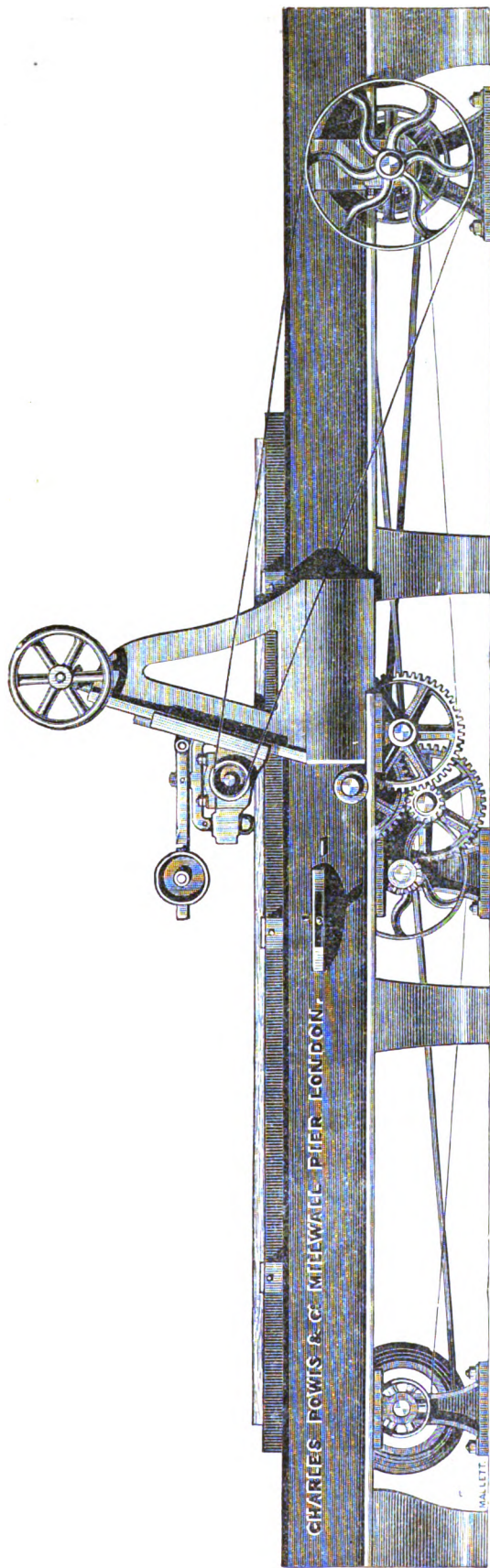
In its design, especial care has been taken to allow as much room as possible between the Saw and framing, thus rendering the Machine capable of cross cutting wide timber. The upright is a cored or hollow casting, and is mounted upon a strong cast-iron base plate, which is usually bolted to the shop floor, thereby dispensing with brickwork foundations. The Saw Pulleys are carefully bored; turned inside and out, and balanced to the greatest nicety; they are then covered with two rings of buff leather, so that the Saw rides easily. Each Machine is fitted with our **Patent Tension Apparatus**, by means of which the top Saw Pulley acts mechanically, taking up the slack of the Saw caused by expansion, and yielding when contraction takes place. The table is made to cant to any angle when required for cutting on the bevel.

	To Cut Wood.	Saw Pulleys.	Driving Pulleys.	Speed of Saw.	Price.
No. 1	12 inches deep	30 inches diameter	12 inches diameter	3000 to 3500 feet	£ 50 0 0
2	15 "	36 "	12 "	per minute	80 0 0

CHARLES POWIS AND CO.,
ENGINEERS,

MILLWALL PIER, LONDON, E. CITY OFFICES: 60, GRACECHURCH STREET, E.C.

TRYING-UP MACHINE.



This Machine is made expressly for Planing and "Trying-up" Scantlings of either hard or soft wood; and however warped or twisted a piece may be, it leaves the Machine perfectly true, and with a good planed face ready for gluing up. The revolving cutter block and spindle are forged out of the same piece of iron, and the Makers have adopted an improved method of forming the cutter block, which has given very successful results, and by which the tearing action of the revolving cutters in ordinary use, when working cross-grained wood, is entirely obviated. To ensure steadiness in working, and to prevent unequal strains upon the bearings, two driving pulleys are employed upon the revolving adze or cutter block. A rebate, bead, or moulding may be cut upon the wood operated upon at the same time as it is being planed, by fixing irons, of suitable form, upon the cutter block. The travelling bed has a variable feed forward of from 9 feet to 20 feet per minute, and a quick return motion. The bed is self-acting in both directions, and any extra length can be supplied at an extra cost of £4, £4 10s., and £5 per foot.

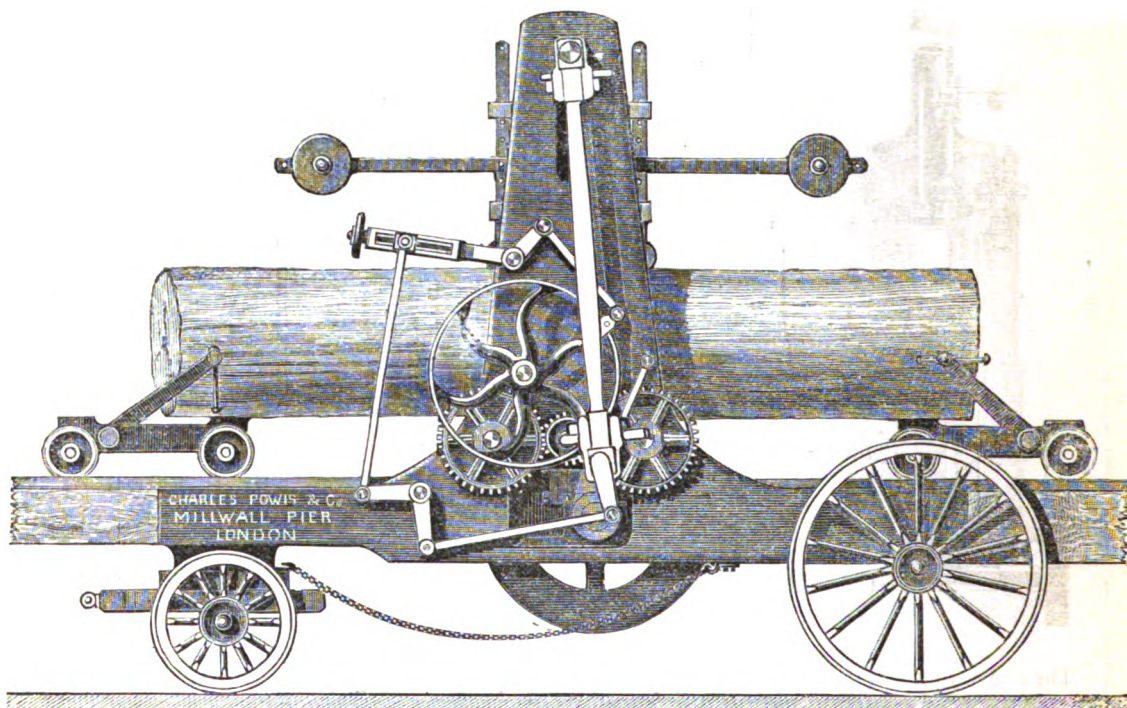
A graduated scale of inches is cut into the slide upon which the cutter block works, by which the man working the Machine can at once set it to cut any required thickness, without having to measure with his rule. The following sizes are made:

Sizes.	Width.	Depth.	Length.	Driving Pulleys.	Speed.	Price.
No. 1	To Plane 12 inches wide	12 inches deep	10 feet long	12 inches diameter	600 revolutions	£ 150 0 0
2	" 16 "	14 "	10 "	14 "	550 "	190 0 0
3	" 21 "	18 "	12 "	16 "	550 "	250 0 0

CHARLES POWIS AND CO.,

ENGINEERS, MILLWALL PIER, LONDON, E. CITY OFFICES: 60, GRACECHURCH STREET, E.C.

PORTABLE TIMBER AND LOG FRAMES ON WHEELS.

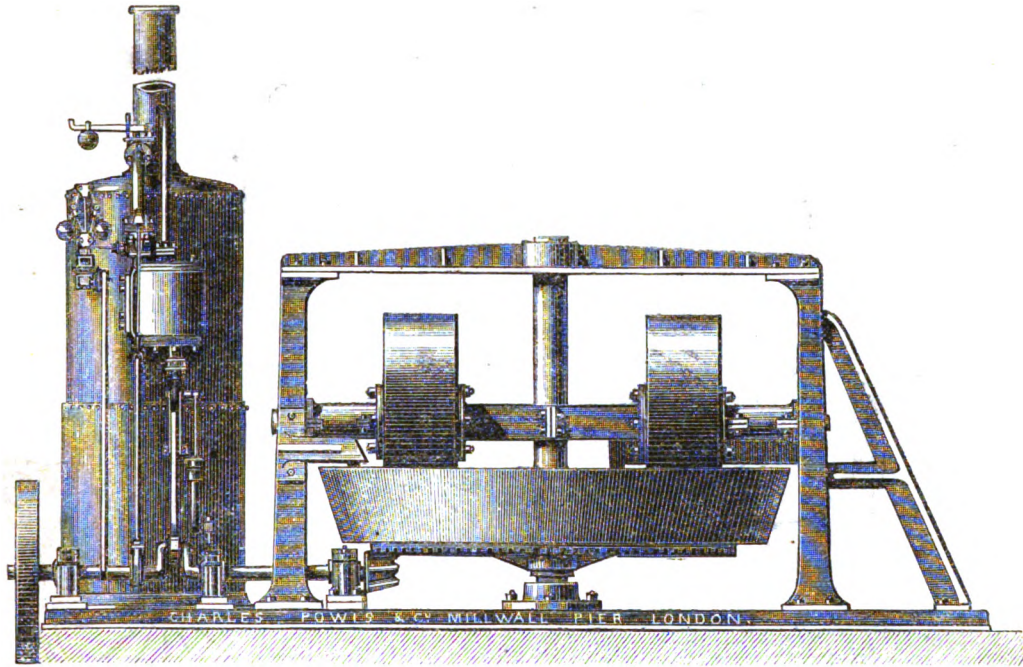


This Frame, being on Wheels, is perfectly portable, and, like a Portable Engine, may be moved from place to place entire, and started to work without the delay and cost of taking to pieces, re-erecting, or building any foundations whatever. All that is necessary, when it is drawn to the required position, is to remove the earth from beneath the wheels until the bed plate is level with the ground. The longitudinals carrying the Bogie rails are laid, and a belt put on the driving wheel from a Portable Engine or other motive power. It is then ready for work, and when that portion of the forest is cleared, it can as readily, and with as little expense, be moved to a fresh position. The Frame itself is constructed precisely as our ordinary Timber Frames; it is mounted on a strong cast-iron bed plate, carried by four strong wheels with shafts and a locking carriage in front; it has two fly-wheels, one on each side; they are both turned, and serve as driving pulleys, so that the frame may be driven from either side as required. The whole of its parts are of ample strength, and complete in every respect. A deal-cutting arrangement is also supplied when required.

CHARLES POWIS AND CO.,
ENGINEERS,

MILLWALL PIER, LONDON, E. CITY OFFICES: 60, GRACECHURCH STREET, E.C.

IMPROVED SELF-CONTAINED MORTAR MILL AND ENGINE, AS DESIGNED FOR HER MAJESTY'S GOVERNMENT.



The above Illustration represents our Improved Mortar Mill and Engine combined. They are quite portable, and are especially advantageous in situations where space is an object, and where the ordinary form of Mortar Mill driven by a Portable Engine could not be adopted.

The smaller sizes are mounted on wheels, and can consequently be readily moved from one position to another, as the work progresses. The Engine, Boiler, and Mill are fitted on a strong cast-iron foundation plate, all complete and ready for immediate work; all that is necessary being to fill the Boiler and light the fire. The Engine can also be arranged to do the necessary Pumping, and to work a Barrow-hoist for raising Bricks, Mortar, Timber, &c.

No.	Diameter of Pan.		Approximate Weight of Mortar Mill.	Price of Mortar Mill.			Power of Engine.	Price of Engine.			Price of Engine and Mill as illustrated.		
	ft.	in.	tons.	£	s.	d.		£	s.	d.	£	s.	d.
1	6	0	5	80	0	0	4 horse	145	0	0	225	0	0
2	7	6	6½	100	0	0	6 „	168	0	0	268	0	0
3	9	0	9	130	0	0	8 „	190	0	0	320	0	0

The Mortar Mills, and also Vertical Engines and Boilers, are supplied separately at the above Prices.

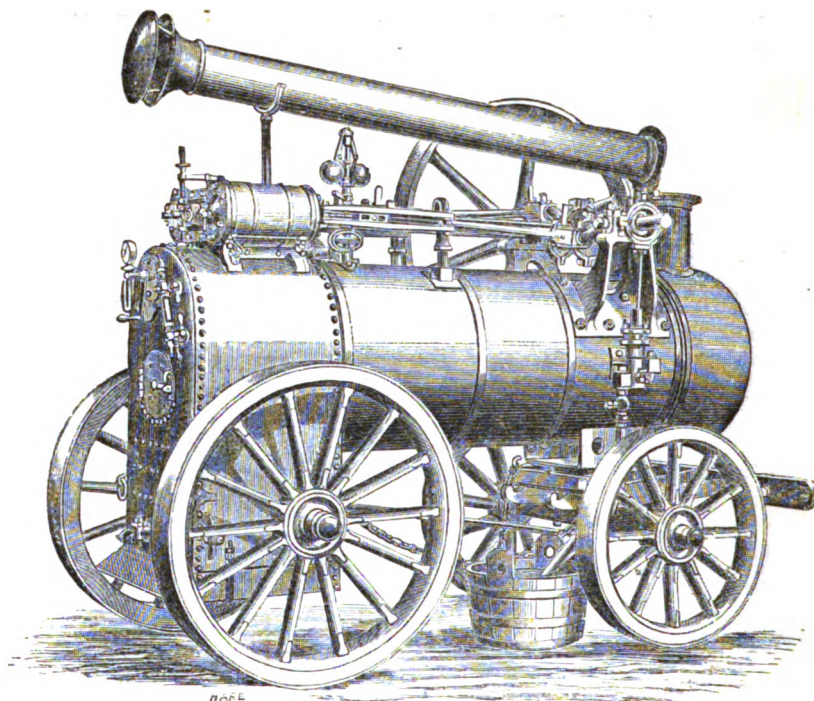
Other Sizes made, and Prices furnished on application.

CHARLES POWIS AND CO.,

ENGINEERS,

MILLWALL PIER, LONDON, E. CITY OFFICES: 60, GRACECHURCH STREET, E.C.

IMPROVED PORTABLE STEAM ENGINE.



The above Illustration represents our Improved Portable Steam Engine, which is constructed on the most approved principles, and made throughout of the best materials and workmanship; it is of great strength and durability, due regard being paid to portability.

Each Engine is supplied with Glass Water Gauge, Gauge Cocks, Blow-off Cock, Tallow Cock to Cylinder, Steam Indicator and Whistle, and provided with Waterproof Cover, Wrenches, Firing Tools, and all requisites.

Engines for exportation to countries where coal is scarce are made with enlarged fire boxes for burning wood, &c., and the chimney is provided with improved copper wire spark-catcher to prevent accident from fire.

Link-motion reversing gear can be attached to this Engine, for which an extra charge is made.

NOTE.—These Engines are also made with Steam-Jacketed Cylinders, Feed-Water Heater, and Patent Variable Expansion Eccentrics, whereby great economy in fuel is effected. The sizes and prices being as under :

Prices of Single-Cylinder Portable Engines, with Fittings Complete.				Prices of Double-Cylinder Portable Engines, with Fittings Complete.							
4 horse-power ..	£	180	8 horse-power ..	£	255	10 horse-power ..	£	320	18 horse-power ..	£	510
5 " " ..		200	9 " " ..		275	12 " " ..		370	20 " " ..		545
6 " " ..		220	10 " " ..		295	14 " " ..		415	25 " " ..		660
7 " " ..		235	12 " " ..		335	16 " " ..		455	30 " " ..		780

CHARLES POWIS AND CO.,

ENGINEERS,

MILLWALL PIER, LONDON, E. CITY OFFICES: 60, GRACECHURCH STREET, E.C.

RALPH H. TWEDDELL'S
SYSTEM OF
HIGH-PRESSURE HYDRAULIC MACHINERY
APPLIED TO
SPECIAL MACHINE TOOLS

For RIVETTING, PUNCHING, SHEARING, FLANGING, and BENDING PURPOSES.

ALSO

PORTABLE HYDRAULIC RIVETTING MACHINES,
FOR BRIDGE, GIRDER, AND SHIP WORK.

DESIGNS, ESTIMATES, AND WORKING DRAWINGS

PREPARED FOR

Hydraulic Machinery for Warehousing Grain and Goods.

In bulk or otherwise ; also for application to

DOCK GATES, CRANES, COAL TIPS, TRAVERSERS,
AND FOR
STEERING SHIPS, WORKING TURRETS, GUNS, &c., &c.

Speaking on this system, an able and well-known writer in 'Engineering,' January 26th, 1873, says :

"To obtain the *full* benefit of such a system of working machine tools as that of which we have just been speaking, it would be necessary, of course, that it should be carried out on a *large scale*, but its employment in *even a less complete form* would, we believe, be attended with advantage. Ample experience has now been had with hydraulic machinery, and there need be no fear of its want of reliability or doubt of its being possible to work it with economy, and just as we now find those who are employing hydraulic cranes and similar machinery convinced of the advantage of the system and unwilling to return to any older plan, so we believe that ultimately we shall find our large workshops *supplied principally with tools worked by hydraulic power*, to the displacement of shafting, belting, and their accompanying complications."

Spons' 'Dictionary of Engineering,' Vol. III., p. 2347, contains also an able and fully descriptive article from one of their contributors on Tweddell's system.

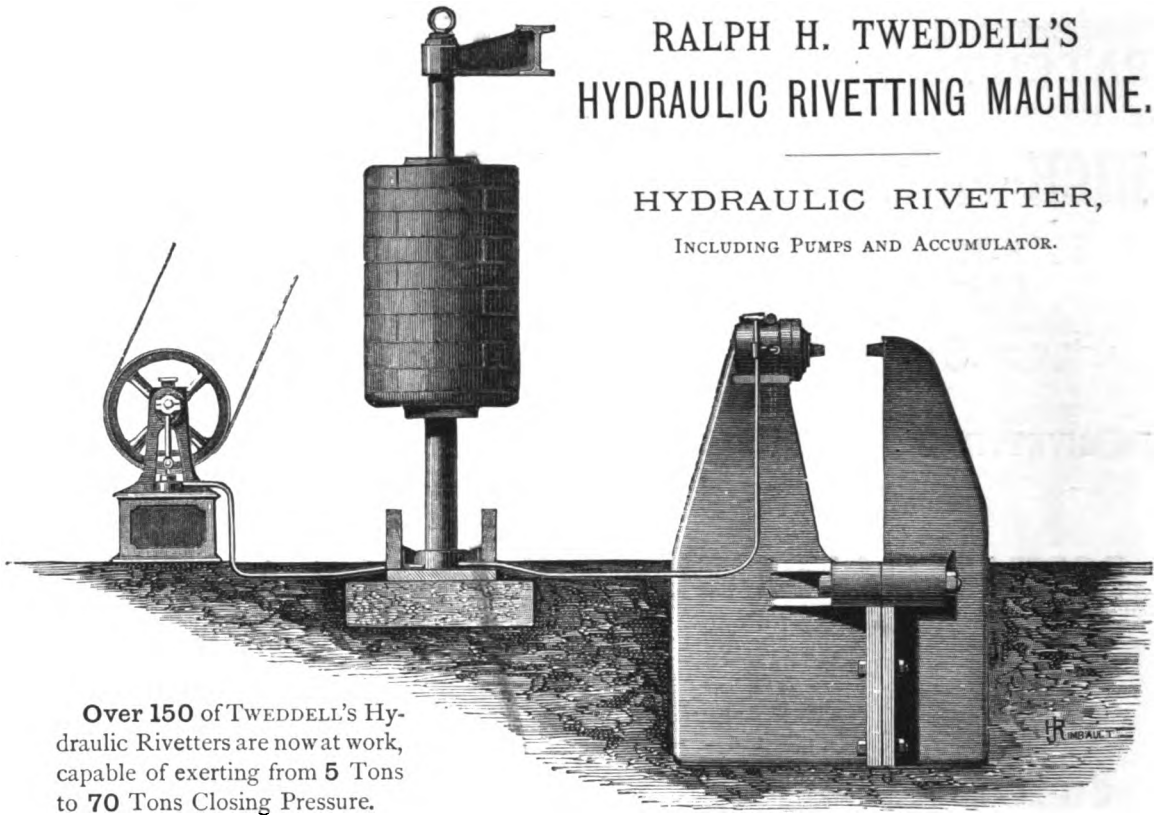
See following pages for some of its applications.

For Prices and Particulars apply to

RALPH H. TWEDDELL,
14, DELAHAY STREET, WESTMINSTER, LONDON, S.W.

RALPH H. TWEDDELL'S HYDRAULIC RIVETTING MACHINE.

HYDRAULIC RIVETTER,
INCLUDING PUMPS AND ACCUMULATOR.



Over 150 of TWEDDELL'S Hydraulic Rivetters are now at work, capable of exerting from 5 Tons to 70 Tons Closing Pressure.

Class.	Dead Closing Pressure on Rivet Head, exclusive of Blow.		Depth of Gap.	Price Complete, including Double Pumps and Accumulator	
	Tons.	ft. in.		£	
A	25	4 6	...	330	
A ²	25	4 6	...	360	
B	25	5 0	...	350	
B ²	25	5 0	...	400	
C	25	6 0	...	400	
D	40	4 6	...	440	
F	40	5 0	...	470	

Class.	Dead Closing Pressure on Rivet Head, exclusive of Blow.		Depth of Gap.	Price Complete, including Double Pumps and Accumulator.	
	Tons.	ft. in.		£	
K	40	5 6	...	500	
G	30	5 0	...	430	
G ²	30	5 0	...	470	
H	30	10 0	...	740	
L	50	6 7	...	685	
M	40	6 7	...	625	

And any other proportions desired.

OBSERVE.—These Prices include Accumulator and Pumps. The Rivetter requires no foundations, and the Pipes only cost about 1s. 6d. per foot run.

A², B², G², have Wrought-Iron Holders-up, and can take in small Tubes and Rivet small Fire-boxes.

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TWEDDELL'S system surpasses all others, either steam, geared, or otherwise, by its combining a dead closing pressure and a sharp blow when bringing the plates together and closing the Rivets. For some of the users, see page 540.

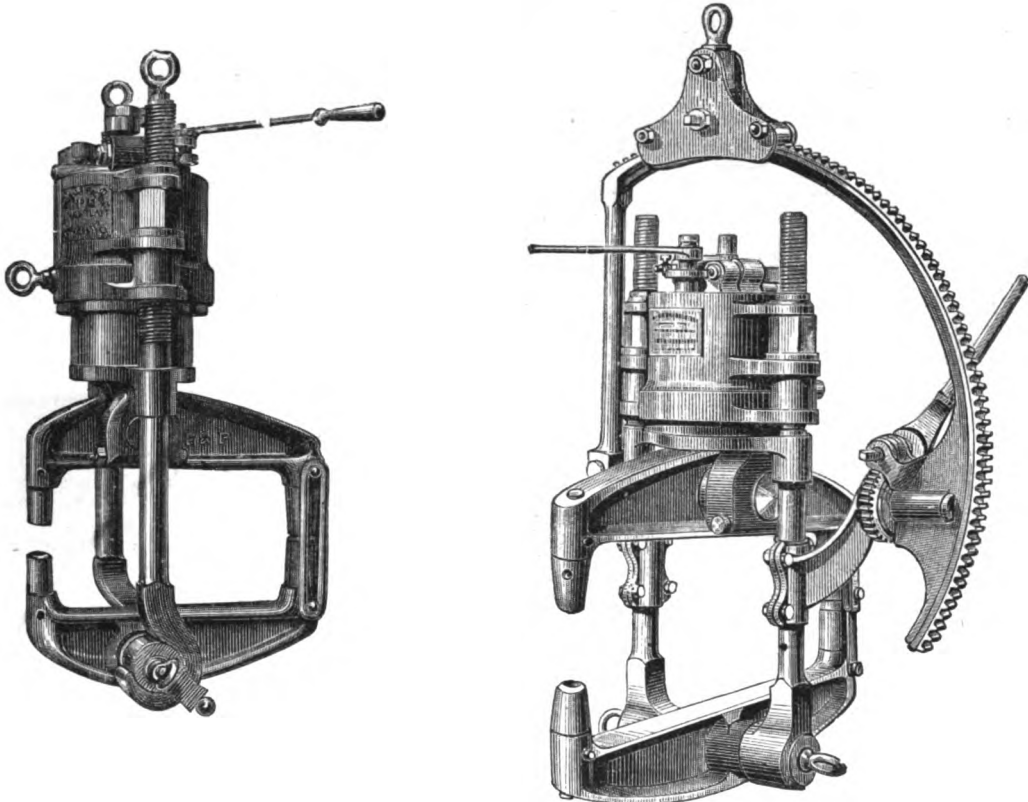
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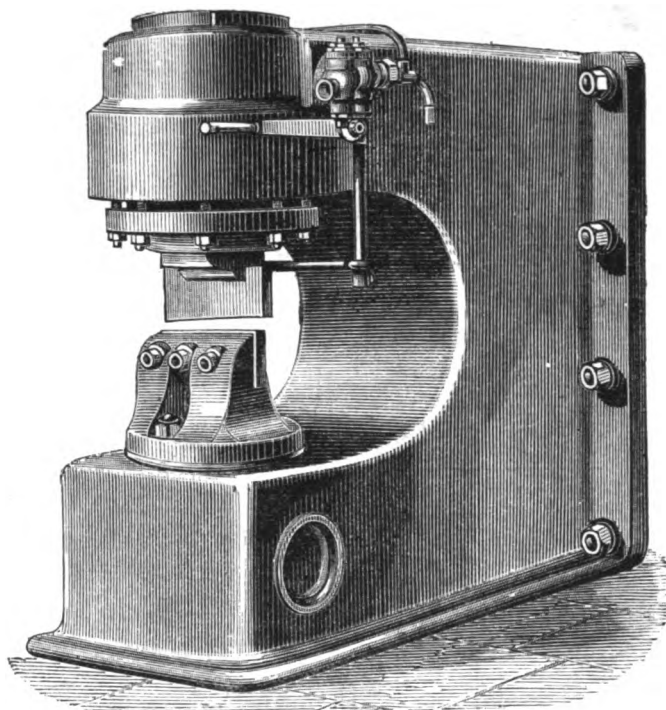
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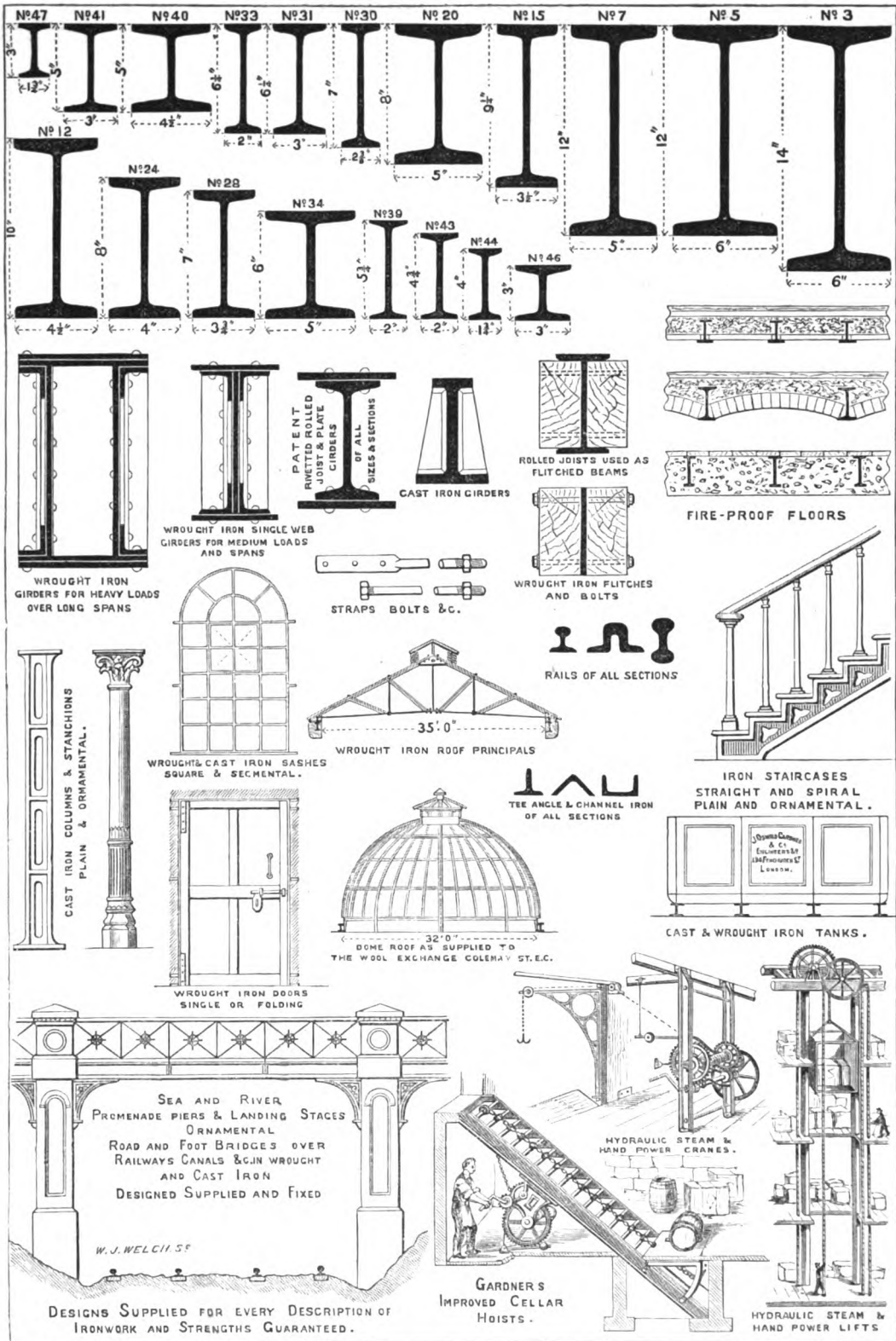
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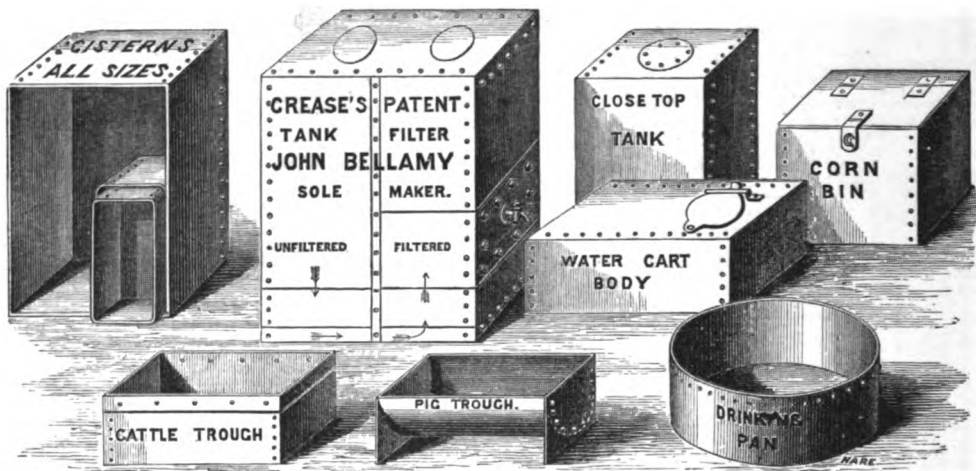
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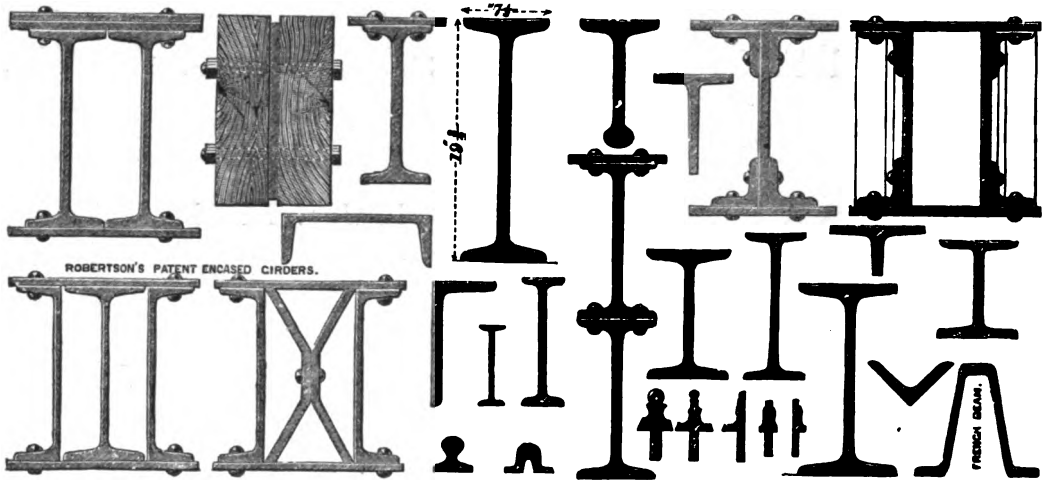
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